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ABSTRACT

A discussion of objectives for an information and documentation center in science and technology is followed by a brief survey of Sri Lanka's research and development system, and an assessment of library and information services available from a research library network, particularly those developed by the Sri Lanka Scientific and Technological Information Center (SLSTIC). Deficiencies in the system for providing scientific and technological information are diagnosed, and a program is proposed to eliminate these through foreign grants to SLSTIC and a bilateral cooperative scheme. It is emphasized that even an efficient system of information provision does not have a strong impact unless combined with an active program for development of a socio-technological infrastructure capable of assimilating and supporting the information provided. Appendices contain background information on information services in Sri Lanka. (FM)

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REPORT TRITA-LIB-1093

APRIL 1979

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DEVELOPING SCIENTIFIC AND TECHNOLOGICAL INFORMATION SERVICES IN SRI LANKA

Stephan Schwarz
Royal Institute of Technology Library

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Report from a mission to the National Science Council of Sri Lanka in the period December 1, 1978 - February 13, 1979

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ABSTRACT

After a principal discussion of objectives for an information and documentation centre in Science and Technology (S&T), a brief survey is given of the system of Research and Development (R&D) in Sri Lanka. The situation of the research libraries is discussed and an attempt made at a critical assessment of library and information services available. Particular attention is given to the functions developed by the Sri Lanka Scientific and Technological Information Centre (SLSTIC). It is shown that, within the range of conventional methods of resource sharing, a successful programme for a co-operative network of research libraries has been implemented. Deficiencies in the system for S&T information provision, it is argued, constitute the "small system syndrome": too little R&D effort to justify sufficient support of libraries, lack of equipment for efficient use of total resources, too weak international contacts, lack of funds for international (computerized) I&D services with a massive back-up of photocopies, and lack of experience in developing training programmes in (and promotion of) modern I&D techniques. A programme proposal is outlined whereby SLSTIC might develop to effectively solve these problems by means of foreign grants and a bi-lateral co-operative scheme. This programme could serve as a benchmark experiment for finding appropriate solutions to analogous problems in other developing countries with small R&D systems. It is emphasized that even an efficient system of S&T information provision does not have a strong impact unless combined with an active programme for development of a socio-technological infra-structure capable of assimilating and support the information provided.

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විද්‍යාව හා තාක්ෂණය පිළිබඳ තොරතුරු හා ප්‍රලේඛන අධ්‍යයනයන අරමුණු පිළිබඳ ස්ථිර සාකච්ඡාවකින් පසුව ශ්‍රී ලංකාවේ පර්යේෂණ හා සංවර්ධන පද්ධතිය යන විශුාල පරිසරයක් තරණ ලැබිය. පර්යේෂණ ප්‍රස්තාපයන්හි තත්ත්වය සාකච්ඡාවට භාජනය කරන ලදුව ප්‍රවලිත ප්‍රස්තාප හා තොරතුරු සේවාවන් පිළිබඳ විවේචනාත්මක තත්සේරුවක් කිරීම සඳහා යත්න දරනු ලැබිය. ශ්‍රී ලංකා විද්‍යාත්මක හා තාක්ෂණික තොරතුරු අධ්‍යයනය විසින් දියුණු කරන ලද තාර්කයන් පිළිබඳව විශේෂ අවධානය යොමුකෙරෙිනි. සාපේක්ෂ බෙදාහැරීමේ ගතානුගතික ක්‍රම ඇතුලත, පර්යේෂණ ප්‍රස්තාප පිළිබඳ සාමූහික ජාලයක් ඇතිකිරීම සඳහා සාර්ථක වැඩසටහනක් ක්‍රියාත්මක කර ඇති බවද දක්වා ඇත. ප්‍රස්තාපවල අඩංගුව සැහෙන පමණ අවශ්‍යතාවට තරම් පර්යේෂණ හා සංවර්ධන ආයතනයන් ප්‍රමාණවත් නොවීම, ඊට සාපේක්ෂ කාර්යක්ෂම ලෙස උපයෝගී කරගැනීම සඳහා උපකරණ නොපැහිටීම, අතිශයින් දුර්වලවූ අන්තර්ජාතික සම්බන්ධතා, පුලුල් ජනතාවට සේවාවන් සහිත අන්තර්ජාතික තොරතුරු හා ප්‍රලේඛන සේවාවක් (පරිගණකයන්ත්‍රගත) සඳහා අවශ්‍යතාවය; නවීන තොරතුරු හා ප්‍රලේඛන ශිල්පක්‍රම පිළිබඳ අභ්‍යාස (හා අලෙවි) වැඩසටහන් සංවර්ධනය කිරීමෙහි ලා පළපුරුද්ද නොපැහිටීම: ආදි විද්‍යාත්මක හා තොරතුරු සැපයීම් උනතා "තුඩා ක්‍රම පද්ධතියක" විද්‍යාමානවන බව දක්වා ඇත. විදේශීය ප්‍රදාන හා ද්විපාර්ශ්වික සහයෝගිතා ක්‍රමවේදී මෙහි මෙම ගැටළු සාර්ථකලෙස නිරාකරණය කරගැනීම උදෙසා තොරතුරු අධ්‍යයනය විසින් ක්‍රියාත්මක කළ හැකි වැඩසටහන් යෝජනාවන් විස්තරකර ඇත. මෙම වැඩසටහන තුඩා පර්යේෂණ හා සංවර්ධන පද්ධතින් සහිත වෙනත් සංවර්ධනය වන්නාවූ රටවල සමානාර්ථ ගැටළු සඳහා උචිත විසඳුම් ලබාගැනීම උදෙසා ඒකාබද්ධවීමක් ලෙස යොදාගතහැකිය.

(පරිශිෂ්ට : ශ්‍රී ලංකාවේ පර්යේෂණ ඒකීස්ඛල හා නිෂ්පාදනනාවය පිළිබඳ අධ්‍යයනයක්: ශ්‍රී ලංකාවේ විදේශාධාර පිළිබඳ අවවැය සහස්ථිරම් ඇත ඇදහස් දැක්වීමක්: ශ්‍රී ලංකාවේ පරිශ්ලණ හා සංවර්ධන ආයතන සමීක්ෂණ: ශ්‍රී ලංකාවේ ප්‍රස්තාප හා ප්‍රලේඛන විද්‍යා සඳහා ප්‍රහුණුකිරීමේ වැඩ සටහනක් විශ්ලේෂණාත්මකව ඉදිරිපත්කිරීම.)

1. BACKGROUND AND MISSION

The National Science Council of Sri Lanka was established by Act No. 9 of 28 February 1968, with Amendment Act No. 44 of 17 December 1968 (refs. 1-2). The main functions were to co-ordinate and promote fundamental and applied research, to advise the Minister on matters of science and technology policy and manpower development, to establish international contacts in Science and Technology and to collect and disseminate information relating to scientific and technical matters.

A revision of the statutes of the Council was passed as Law No. 36 of September 9, 1975 (ref. 3) Among the duties specified was to "establish and maintain a scientific and technical documentation centre" serving the Council and the research community at large.

The formation of a "National Scientific and Technical Documentation Centre" was investigated in December 1968 by Mr. L.E. Samarasinghe of Unesco, in response to a request (3 October 1968) to Unesco by the Department of Foreign Aid (Ceylon). The report (ref. 5) was published in March 1969. Its recommendations were promoted by the NSC in order to obtain UNDP aid for a project. Due to priority decisions within the Ministry of Industries and Scientific Affairs, the idea had to be suspended until 1977, although repeated efforts were made in the meantime for a revival (cf. 8.1).

Soon after its formation in 1968, the NSC set up a library to supply literature and other information needed for the work of the Council and its various committees. Activities of the library naturally expanded into a number of important I&D services and co-ordinating functions in support of the system of research libraries in Sri Lanka. By 1978 the cadre had increased to 20, and the library took on the new name "Sri Lanka Scientific and Technological Information Centre" with the acronym SLSTIC (cf. Ch. 8 and refs. 4, 7).

A revised project for development of I&D services in Science and Technology was defined in 1977 in co-operation between the National Science Council of Sri Lanka and UNDP (ref. 6). The document was signed by the Sri Lanka Government on 21 July 1977 and by UNDP on 31 October 1977. The project runs for 4 years (1977-81) and has a budget of US $ 364,064 (UNDP input) and Rs. 1,157,300 (Government input). A project revision (no. 1) was signed by the Executing Agency (Unesco) on 20 March 1978.

As Unesco consultant I worked at the National Science Council for 2 months from 2 December 1978 to 13 February 1979. The present report gives an overview of the user community, the present systems of information provision in Science and Technology, a formulation of objectives for a development programme, operational goals and functions for SLSTIC and a suggestion for an extended financial support.

The terms of reference of the mission were as follows:

"The consultant, acting upon the instructions of the Director-General of Unesco, shall: Within the framework of Unesco/UNDP assisted project SRL/77/004, proceed to Colombo and, in collaboration with the staff of the Sri Lanka Scientific and Technological Information Centre (SLSTIC) and the National Science Council of Sri Lanka and other responsible officers:

1. *review the work done at the Sri Lanka Scientific and Technological Information Centre,*
2. *advise on the improvement of information services of the Centre, including operation of SDI services and preparation of indexes, bibliographies, information bulletins, union catalogues and other publications published or to be published by the Centre,*
3. *advise on the improvement of organization of the work of the centre,*
4. *advise on the application of modern techniques in information storage and retrieval,*

5. *advise on the equipment necessary for 2,*
6. *advise on the collaboration of the centre with other libraries and information centres with a view to building a national information network in the country,*
7. *prepare a training programme for the staff of the centre and advise on the necessary training facilities,*
8. *advise on other matters requested by the Government."*

The ideas advanced in the report are based on the assumption that a relatively high-level programme can be financed. If this turns out to be impossible, a more modest level of development has to be accepted where, however, a number of the essential features of an effective information provision system cannot be established and maintained. Since there are several different low-level alternatives, depending on where to put the emphasis of development, the matter is open to discussion between the parties involved. Details of a scheme can be worked out once appropriate directives have been issued.

2. TOWARDS A PROGRAMME FOR DEVELOPMENT OF SLSTIC (SUMMARY OF REPORT)

It is evident, from the following review of the present status of S&T information provision in Sri Lanka (Ch. 5-6) and the presentation (Ch. 8) of the Sri Lanka Scientific and Technological Information Centre (SLSTIC), that a successful programme to co-ordinate resources and efforts into a network of research libraries has been conceived and implemented in the past couple of years. For natural reasons there has been an emphasis of "conventional" library-oriented activities, like union catalogues and directories, a system for inter-library loans, and the beginnings of a joint acquisition scheme for periodicals and abstract journals.

It is readily seen that a number of improvements could be introduced in order to attain the objective of a system for S&T information provision that approaches the services available in highly developed R&D systems. Such improvements have to be worked out in parallel along essentially five different (albeit interconnected) lines of action:

a) further development and extension of on-going services
b) introduction of new local services
c) establishment of a bi-lateral service agreement with a foreign I&D centre to provide computerized individual-oriented literature searches and back-up service of photo-copies
d) development of a comprehensive and flexible programme for education, training and promotion of I&D services in order to raise the awareness of the role of literature in R&D and to foster a greater literature-mindedness in the user community and a greater service-mindedness on the part of library staff.
e) research on cognitive, technical, social and economic aspects of the role and transfer of S&T information in order to give incentives for improvement of services.

It is noted in the analysis of findings concerning the R&D system and the system of S&T information provision in Sri Lanka (see Ch. 9), that the set of problems hindering the rise to an international "standard of excellence" (except for limited areas enjoying favourable conditions) can be described under the general heading of the "small system syndrome". It is argued that some of the aspects of this syndrome can be alleviated by extraordinary measures. It is also argued that the size of the R&D system and the lack of an adequately dimensioned socio-technological infrastructure providing the living conditions of the R&D system may preclude certain developments even if financial support (e.g. as foreign grants for equipment

and training) are available. Further, indigenous R&D, as perceived by its practitioners and administrators, and by the educational system, is not always (or generally) given a role that permits taking advantage of opportunities or a full utilization of available resources (cf. ref. 30). Finally, the role of information provision in R&D is not fully understood, with sometimes too great expectations associated with I&D services. It would seem that at least technical literature is to some extent rather an exponent than a promotor of technical advance, and in any case there is a complicated interplay between the level of development of an S&T system and its ability to assimilate and take advantage of S&T literature. Providing access to literature (information) does not by itself solve the problem of introducing innovations.

2.1 Summary of recommendations for development of on-going activities

2.1.1 The "Union Catalogue of Foreign Books" is described in (6.2.1). It is now available only as a card catalogue at SLSTIC. It could be transformed into computer processable form and continually updated. This would allow for the issue of cumulated catalogues on COM-microfiche, to be distributed to all libraries. The joint acquisition list "Current Science Bulletin" would come out as a spin-off product. A minicomputer, or an intelligent terminal could be used for input. The final processing would have to be performed abroad (as part of the bi-lateral co-operation scheme outlined for the computional retrieval services (see 2.3)).

2.1.2 The "Union Catalogue of Foreign Periodicals" is described in (6.2.2). This file could equally well be computerized (minicomputer or terminal cum external computer) for production of updated lists of holdings. This is useful not only for the inter-library loans system, but also for the gap-filling process necessary in the on-going build-up of national S&T library resources. An up-dated list could be regularly taken out on a fast terminal-printer and reproduced by offset.

2.1.3 The bulletin "Science Index" (index of Sri Lanka S&T publications) and the associated "Reports Depository" at SLSTIC are described in (5.3.8). The index might easily be computerized in the same way as suggested for the union catalogues and the latest additions taken out on a fast printer for production of the bulletin. The scheme of a depository, important also for R&D policy analysis (see Ch. 1 and Appendix III for the terms of reference of the National Science Council) and for the regional exchange programs (6.3.5). Since the depository so far depends on voluntary agreements for contribution, it is not possible to attain a satisfactory level of completeness. A firmer authorization for this SLSTIC activity would be needed.

2.1.4 A number of directories have been compiled by the NSC and SLSTIC (6.3.1) Some of these do not need frequent updating, while others, like the files of on-going research projects and of S&T manpower, need to be continually revised. The personnel file has already been computerized for statistical processing. The project catalogue has not been updated for several years. Although the present size of the system would not per se require computer-handling, due to the complexity of description some kind of automatic processing, (even if not on-line) would be extremely convenient for many purposes, inter alia reviews for R&D policy analysis and referral services within the community or internationally. Some kind of authorization for a comprehensive coverage of such files will be needed for this SLSTIC activity.

2.2 New services and activities

2.2.1 Joint acquisition programme

The disadvantages of dispersed acquisition in a small system are discussed in Ch. 5. It is pointed out that many difficulties might be eliminated by a joint acquisition programme, e.g. in terms of a clearing-house operated by SLSTIC. This would lead to a much better economy in the use of available resources, simpler forms of handling foreign book programs, faster delivery and more reliable delivery control. The gap-filling process (6.2.2) for incomplete sequences of periodicals would come out as a part of this programme. Some kind of authorization for a simplified handling of foreign accounts would be needed. The administration of such a clearing-house would be facilitated by a mini-computer, but could certainly be handled manually in the initial phase.

2.2.2 Editorial secretariat

The idea of an editorial secretariat for S&T publishing is discussed in (7.1.1). It is noted that the main problem of Sri Lanka S&T publishing is not, as frequently assumed, in printing facilities but in supply of high quality manuscripts and in professional editing and production. The secretariat for NSC publications could easily be extended to give advice and technical aid for support towards upgrading of a couple of journals to an international standard of excellence. This would have a positive effect on the self-consciousness of the R&D community in Sri Lanka, and would yield an important asset for exchange in the joint acquisition scheme for foreign periodicals (cf. 5.3.9 and 6.3.5). The secretariat could also select and translate materials for an S&T journal directed towards the general public, in keeping with the expressed need of high-quality information accessible to the non-professional readers (see e.g. the objectives of NSC and SLAAS, Appendix III). The secretariat could further develop and present courses (7.2.2) in S&T writing and in editing and preparation of camera- ready manuscripts for offset-printing, which emerges as the most important technique for fast and reliable report-production.

2.2.3 Regional contacts

The need for a national centre authorized to develop contacts with various sources of S&T information, regionally and internationally, is discussed e.g. in (6.3.5). At present only ad hoc contacts are maintained, depending on personal or institutional inclinations and particular interests. A scheme for more systematic liaison with external centres, including referral to potentially interested users in Sri Lanka, should be a prerequisite for justifying a more advanced system of I&D services.

The national input to international data bases, like AGRIS and the proposed health related system HERIS, is discussed in (6.3.4). It is suggested that SLSTIC take on the operational role of compiling the material and producing an input in the desired format. The work on up-to-date directories of S&T projects and personnel gives an ideal overview of the on-going multidisciplinary activities relevant to the different reporting commitments. The same should be true for referral services like that co-ordinated by UNEP (UN Environmental Programme). The overall formal responsibility for these activities could still remain with the administration or departments now charged with these tasks.

2.2.4 Technical services

In the present development program for SLSTIC a modest involvement in offset printing is foreseen, mainly the printing of the Centre's own catalogues, bulletins and reports, but to some extent in support of similar publishing needs within the research

library network (7.3.1). Some photographic and printing equipment will be purchased from available foreign grants.

Some activity in microfiche production (e.g. doctoral dissertations (cf. 7.1.3) is suggested, whereby existing equipment might be used to begin with (7.3.3). Further, possibly some union catalogues will be produced as COM-microfiches in the bi-lateral co-operation scheme suggested in (2.3). An increased acquisition of reports on microfiche (e.g. NTIS, TECHNONET (cf. 5.3.10)) may be foreseen. Equipment for copying of fiches (placed at SLSTIC) and several readers to be located in major research libraries will have to be procured from available foreign grants.

The need for modernized techniques for book binding is discussed in (7.3.4). It is suggested that SLSTIC promotes this development by establishing a small binding unit taking commissions for the major S&T libraries and subsequently offering training and apprenticeship. Some equipment and consumables at relatively low cost will be required.

Photocopying of S&T literature, mainly journal articles has revolutionized literature usage in the large research communities. The need of modern plain-paper copiers for efficient use of library resources is discussed in (6.2.2) and (7.3.2). It is suggested that part of available foreign funds should be used for purchase of 10-12 photocopiers to be located in the major S&T libraries, the ownership for practical reasons (e.g. service contracts) to be retained by SLSTIC.

2.2.5 Computers

The computer situation in the S&T system of Sri Lanka is briefly reviewed in (7.4). It is noted that most installations are small, by present standards, and that only a couple of existing or planned configurations are suitable for the library and documentation applications of interest in the development project for SLSTIC. Even so it is doubtful whether these will be administered in a way to allow time-sharing or off-line resource-sharing with sufficient reliability of access. It is also noted that of the mini-computers now marketed in Sri Lanka, the Wang 2200VS seems to meet the requirements defined by the applications in view.

For reasons related to the "small system syndrome" (cf. Ch. 9) it is recommended for the initial stage to acquire an intelligent terminal (with diskette drives) as an input device, the processing of files to be performed at some computer installation in Sri Lanka or abroad. It should be noted that software packages for text-processing are now available for many terminals of this kind, finding extremely useful applications in library work (cf. 7.4). At a later stage it may well be justified to acquire a mini-computer for management of a long series of applications, some of which were sketched in earlier parts of this chapter and will be presented in more detail in chapters 5-6.

2.3 Computerized (and "manual") I&D services

The development of a programme for provision of information and documentation services, both manual and computerized, and corresponding educational programmes, constitute the main extension recommended for development of SLSTIC. In (6.2.3) the availability of abstracting and indexing journals is discussed. The small-system-syndrome here shows up in the dispersion of resources making it difficult to follow up the literature regularly by manual searches. With the present reading-habits and lack of literature-mindedness in a large part of the S&T community (cf. 4.2) it is doubtful whether available resources are really fully used. In order to attain the general objective of providing I&D services that give working-condition approaching those in the large R&D system (cf. Ch. 3), a quite new line of action has to be introduced.

The procedure suggested is based on experiences from a bi-lateral programme pursued since 1975 by the RIT Library and the CDCT (Centro de Documentação Científica e Téchnica) in Lisbon, Portugal (cf. refs. 28 and 29). An agreement for co-

operation between SLSTIC and the RIT Library would be worked out, whereby RITL is to provide computerized current awareness searches and retrospective (on-line) searches for S&T projects in Sri Lanka. It would be foreseen that, subsequently, much of the intellectual work, like profile construction (cf. the description of search logics in Appendix V) and analysis of feedback (evaluation of searches) will be done by SLSTIC staff. Further a back-up service of photocopies for articles from journals not available in the Sri Lanka research library system would be offered, although in the long run much of this material should be supplied within the region (cf. 6.3.5). Finally a programme for education training and promotion would be developed (see 2.4). In conjunction with local efforts of documentation in areas not covered by the international data bases (cf. 6.3.2 and 6.3.5) and a more extensive use of available abstracting and indexing journals, this project would very efficiently and rapidly solve most problems of S&T information transfer as regard the world literature. It could, however, not solve the problem of lack of personal contacts, under-critical size of S&T subsystems and deficiencies in support from the surrounding socio-technical infrastructure (cf. Ch. 9), nor the problems of extension services discussed in (6.3.3). Such problems will have to be dealt with in parallell in order to make efforts and investments in I&D services meaningful.

2.4 Education, training and promotion

A major effort on raising the literature-mindedness within the S&T community, i.e. the general attitude towards the role of S&T literature in R&D-work and the need of life-long professional training, will have to be included in the development programme for SLSTIC (cf 3.3, 4.7, 6.2.1). The new services to be offered through the bi-lateral co-operation scheme for computerized individual-oriented searches call for extensive training, not only in the use of literature, but also on problem definition, search strategies and selection of alternative sources for information provision. Also for the information-professionals (librarians, documentalists) there will be a need for training programmes both on technical matters and towards a general outlook of the changing role of literature in research and development. The technique of computerized searches is extremely involved and the training of documentalists to become independent takes a long period of dedicated study and apprenticeship, including some experience of actual interactive search, and some insights in computer programming. In general, there will be a need for promotion of services since, even if they are in principle available at SLSTIC, it takes large and continous efforts to bring out the message to all potential users. These aspects are indicated in (7.2), where also a training programme for S&T report writing and editing for offset printing is suggested. With reference to the large variety of user groups and needs (cf. Ch. 3) the training programme should be developed in modules to be combined into courses tailored to each particular purpose. Considerable experience of such programmes has been gained by RITL staff, but it is certainly an effort that will have to extend over several years within the bi-lateral scheme, before sufficient know-how has been transferred and important characteristic features relating to Sri Lanka have been included.

2.5 Statistics, evaluation and research

On several occasions in the report there has been reason to note the lack of reliable statistics pertinent to policy-making and planning of developments in the library and information field (e.g. 5.1 and 6.3.1). The need for a continuing estimation of the price developments of literature and the calculation of an annual "price index" as a basis for budget allocations is discussed in (5.2). Also, phenomena like the underutilization of services (e.g. 6.2.1 and 6.3.4) are not easily understood without studies of the context, the effects of promotional programmes, the perceived vs potential needs etc. The general need of "library and information science" studies and

some sociologically oriented studies is indicated in (6.4). For successful implementation of a development programme for SLSTIC, a number of investigations and evaluations related to the impact of new I&D services will have to be pursued. This has already been done for advanced S&T systems, but the "small systems syndrome" is associated with quite specific problems. A continuous feedback of results from such studies will be an important control mechanism for the evolution of information services and training programmes, and a policy instrument for effective use of available resources. It is therefore suggested that SLSTIC is given a couple of positions for a research group and resources for building up a literature collection on "library and information science."

2.6 Aspects of staff, working space and finances

2.6.1 The cadre of SLSTIC is presented in Ch. 8. Of the 22 positions, 7 were vacant in January 1979. This gives an opportunity for redefining some of the job descriptions as is also indicated in table 6 (Ch. 8). Apart from the editorial secretariat, which is already operational within SLSTIC by one research officer (for "Vidurava" and "Journal of the National Science Council"), and the research group suggested in the last paragraph, the number of positions should be sufficient for most of the new activities if a "soft start" is envisaged. Training in both documentation techniques and technical services will however, have to be included in the programme of personnel development. As the new activities become established and the usage increases, the staff has to be increased to cope with the increasing work load. This development is largely dependent on the interaction of the Centre with the user community, and on the response of the S&T system to the Government's policies for higher education and research. It is, however, reasonable to assume that the total cadre will not have to exceed 30 even in a stage of a relatively large volume of I&D services of the kind outlined in the report, in particular as certain components (including the educational programmes) can gradually be decentralized.

2.6.2 The working space for SLSTIC is at present very limited, and extensions will have to be considered. A certain growth of the library and of undisturbed working conditions for both professional staff and visitors in the library area must be foreseen. The professional staff of SLSTIC will need better offices, permitting also meetings, educational work in small groups and private consultations. The workshop activities (printing, photocopying and binding) need separate working space (including a dark-room). Some material requires special storage conditions, e.g. low temperature (refrigerator). At least a limited area ought to be air conditioned to present better operative conditions for the terminal (and later on for a mini-computer). In general, there is a need for a dustfree environment enhanced by the use of fans for aircirculation. The floors of the entire working area should be covered with ceramic (washable) material and systematically (daily) vacuum-cleaned. If possible, air circulation should be operated by a central installation with dust-filter.

2.6.3 The investments in equipment depend on the level of ambition, since there is a wide range of different articles available on the market. One main requirement is that, as far as possible, there should be a service organization present in Sri Lanka, which limits the choice considerably. A rough estimate for the equipment needed to carry out the programme as outlined might look as follows:

10 photocopiers (plain-paper type) with 5-year service contract (US$ 4.500 each)	45.000	US$
10 microfiche readers with exchangeable optics (US$ 450 each)	4.500	US$
Equipment for copying of microfiche (diazo-copies)	3.000	US$
Equipment for offset printing (Gestetner) (including plate-maker, fuser and manual guillotine cutter (cf 7.3.1)	20.000	US$
Optical equipment for reduction of offset originals	5.000	US$
Conventional dark-room equipment and camera	3.000	US$
2 IBM "Golf-ball" typewriters with set of type heads	3.000	US$
Intelligent terminal with diskette drives and daisy-wheel printer (Diablo-type)	20.000	US$
Diskettes for file-storage	1.500	US$
	105.000	US$

(For the question of a minicomputer see (6.4) and (2.2.5)

The external costs (annual) for the bi-lateral co-operation project summed up in (2.3) can be estimated as follows (with reference to experience from the RITL-Portuguese development programme, refs. 28 and 29):

1.	Education - Programmes for training in library and documentation services of documentalists, research staff and students. These courses include the use of advanced searching techniques in computerized files.	25.000	US$
2.	Visits - Training of documentalists in advanced techniques abroad and visits of foreign experts to give training courses in Sri Lanka. Also expert help in the use of the proposed electronic equipment for library & documentation work. (transport by Aeroflot envisaged)	15.000	US$
3.	Administration and Planning - The cost of the co-operation programme incurred by the foreign I&D centre in the context of providing training for visitors, etc. Also cost for back-up service for photocopies of journal articles not available in Sri Lanka.	10.000	US$
4.	Information Services - Provision of computer based information services in response to individual profiles and in the context of training programmes (estimated on the basis of 50 regular profiles for SDI services and a reasonable amount of retrospective searches)	25.000	US$
	Total annual cost (at 1978 cost level)	75.000	US$

This amount will be needed annually for a 3-year period. At the end of this period the project should be reviewed. A further 3-year period on the same level for the information services part, and on a lower level for other items, should be envisaged.

To ensure financing for a 3-year period and to open a prospect for a follow-up project for a further 3-year period (in the same way as in the RITL-Portuguese program), it is suggested that contacts be taken up with SAREC (Swedish Agency for Research Co-operation). A sufficient backing is required to make it meaningful to embark on the bi-lateral support project outlined.

2.7 Organization of SLSTIC

The programme for development of SLSTIC outlined in the report appears to be a natural evolution which could well take place within the present organizational framework. Possibly, the "Working Committee on Scientific and Technical Information" recently established within the NSC might function as a steering committee for the Centre. There already exists a number of more or less formal groups set up to work out agreements within the research library network and to advise on policy considerations for SLSTIC planning and operations. The proposed research group will be able to do much of the analysis and other preparations of material for the work of the steering committee and other bodies concerned with I&D services in Science and Technology. It should be possible to solve the question of authority in the context of certain obligations (e.g. the reports depository (5.3.8) or the file of on-going research projects (6.3.1)) in a functional way not imposing too much administrative rigour. This and other details of organization will emerge as a consequence of policy decisions concerning the entire development project for SLSTIC.

3. PRELIMINARY CONSIDERATION OF OBJECTIVES

The objectives of an I&D centre within the NSC have been formulated in a general way (refs. 5 and 6) that may be restated in terms of:

1. *Creating a central information service in Science and Technology that, on request, can retrieve and gives access to relevant material (documents, data etc.) through local or external sources,*
2. *Coordinating different services in the country that provide general, sectorial or specialized sources of such material so as to create a network of interlinked I&D activities available to potential users.*
3. *Developing and implementing training programmes in documentation techniques to supplement existing courses in librarianship and library use.*

Such general objectives have to be particularised in order to yield operational goals and activities. This has been done by restricting the area roughly to needs within the R&D community, and by defining a number of urgent projects, mainly in order to co-ordinate resources of research libraries within the country. As will be obvious in the sequel, there have been very good reasons for this policy, and good results have been achieved in short time, both tangible and, perhaps even more important, in creating a psychological climate responsive to co-operation. The central issue is now how (or whether) to widen the scope, and how to redefine the operational goals in order to advance a couple of steps further.

To fix the ideas, let us first think of an (hypothetical) ideal situation of information transfer. We can imagine a super-storage system holding all material (documents, data etc.) that has been produced and a super-retrieval system that can identify and produce all material relevant to a given problem (automatically weeding out obsolete or questionable items). This system is operated by a super-user, who has his problem absolutely clear in his mind, the knowledge to assimilate all material and the critical ability to make assessments and to extract and integrate what he needs for his own purpose. There may be scientists who meet these requirements of an ideal user in a specialized field although, ironically, only few of them would need this kind of information services, but it is certain that the imaginary information system does not exist (and in fact cannot exist in virtue of the nature of knowledge itself).

All existing systems of information provisions therefore are approximations to an ideal situation with deficiencies of greater or lesser importance. Even the scientifically and technologically most advanced countries depend on co-operative networks (national and trans-national) of libraries and information services, on numerous special activities (e.g. data-base production) etc. Available retrieval

techniques require skill and perseverance in order to yield an output that approaches the ideal response, and become useful only in conjunction with personal experience and personal contacts, that contribute the redundancy needed for stability in information processing.

These considerations, trite as they may seem, are quite important when defining objectives for information services. The common mistake is to define objectives in too general terms, with the consequence that there is no frame of reference for evaluation of practical results. The problem in a country with very limited resources for R&D (and no space for inefficient spending) is 1) to decide which approximation to an ideal system for information provision can be viable within the resources available, and 2) to determine how to invest aid funds into a design that meets user needs not only in a short-term perspective. In practice this may call for a continuous revision of the programme, whereby some activities may have to be abolished to give way to more useful ones. This should then not be regarded as a matter of defeat or criticism, but rather a matter of natural evolution of sub-systems interacting with one another for improvement of the system as a whole.

For consideration of priorities and discussion of such operationally formulated objectives, it is necessary to look at the information sources available, the groups of (potential) users and the relative merits of alternative choices of emphasis. Limiting the discussion to information in Science and Technology, it is possible to distinguish, according to main functions, a number of different sources, like:

- research libraries (collecting and retrieving documents etc.)
- information and documentation centres (creating and processing bibliographic information and data collections)
- research institutions (including university-based research)
- institutions of higher education
- institutions of secondary education
- professional societies
- extension services
- publishers (scientific literature, textbooks, vulgarization)
- mass media (daily press, radio, television)

Correspondingly there are different user types like:

- policy-makers in R&D (Ministry of Science and Industries, Research Councils)
- administrators (in S&T-related enterprises or services)
- committees (with S&T-related duties of inquiry)
- research staff (universities, research institutions)
- students (college, undergraduate, post-graduate)
- professionals (med. doctors, engineers, industrial scientists etc.)
- practitioners (in areas depending on applications of S&T)
- general public (seeking general knowledge on S&T, or information in matters of political concern)
- documentation officers (performing searches requested by the other categories of users)

For comments on the functioning of the sources "extension services" and "mass media" with respect to the user groups "practitioners" and "laymen" see the recent UNISIST study presented in ref. 8.

The user types listed all have different purposes dictating their needs, all of which may be important in their own context. Any individual will normally find himself having different "affiliations" depending on the problem and its relation to his different roles. Further, the user types mentioned have links of various strength to the information sources listed, and representatives of these sources are themselves users (like the documentation officers) with links to other sources. So, for example,

would the layman normally (by definition) not be able to assimilate current scientific information directly, but would rather rely on getting it in digested form (vulgarizations, surveys) delivered by mass media or semi-technical journals. The same person could, in another context, be a professional requesting information services from his society, including its publications, or from a library and documentation centre. And research institutions would normally have own libraries with links to other research institutes and information centres.

It is obvious from these simple considerations that the "I&D centre" is not a panacea for satisfying all possible information needs of all possible users, even in a restricted field (cf. 6.3.3). On the contrary, a partially hierarchical system of institutions (functions), acting as information sources integrated in the social system of users and producers of information, jointly supply the information needed by different individuals in different circumstances and different forms. Further, any policy will give rise to services that respond in various degrees to the needs of different user groups, and therefore generate an uneven distribution of user satisfaction.

The important observation to make here is, however, that the S&T library and information centre is somehow on the top of this semi-hierarchical structure. A strengthening of this function can, if appropriate attention is given to the matter, generate improvements in all other links on different levels. However, it is not viable to reproduce these other services within the framework of one single I&D centre, since they have different characters which require both different environments and staff with different training and experience.

In the light of these considerations, I will endeavour to formulate a general objective for the S & T Information Centre which can subsequently easily be broken down into a sequence of operational goals:

"The objective of the Sri Lanka S&T Information Centre should be to create, within the resources available, a system for information provision to personnel involved in research and developent in Sri Lanka which effectively approaches the international standards of information provision in countries with strongly developed research systems. Further, in order to meet the needs of users that cannot immediately use undigested S&T information the Centre should provide such information as support to (and to be processed by) appropriate intermediary information services."

It appears from this formulation, that the Centre has to extend and consolidate the co-ordination of existing services for efficient use of resources, to develop supplementary services effectively linking the research system in Sri Lanka to information services in the large research systems abroad and to promote these services by training and marketing programmes in order to create awareness of options and knowledge of how to use them.

The procedure I will follow in investigating the possibilities for such a programme and its details, is to survey the present environment of research libraries and I&D services, to review the work of these units themselves, to look at some technical constraints and finally to propose a scheme of development of STI/SS. First I will, however, make a few remarks on the general framework for information dissemination.

4. THE RESEARCH SYSTEM SEEN AS AN INSTITUTIONAL FRAMEWORK FOR LIBRARY AND INFORMATION SERVICES

When discussing the systems of S&T information provision in Sri Lanka it is necessary to take into account a number of specific features that set the scene for a realistic assessment of development ideas. A recent comprehensive presentation of the role of Science and Technology in Sri Lanka is given in the Sri Lanka official contribution to UNCSTED (UN Conference on Science & Technology for Development (STD), ref. 9. In spite of different focus (here mainly on Library and Information Services) there is inevitably some overlap in presentation of framework and problems. The idea (ref. 9, §190) of a "Global Centre for STD Information Exchange is discussed in Ch. 9, and it will be observed that the bi-lateral co-operation suggested in (2.3) effectively creates the service required.

4.1 Some concepts

(a) Science and Technology: The concept of "Science" is here understood in a wide sense, even wider than the German "Wissenschaft", in spite of the Anglo-Saxon influence. This probably is an effect of the small-size system and the late growth of indigenous research. In the combination "S&T" it comprises, apart from areas normally included in Natural Science Faculties, also medical sciences (including dentistry and veterinary medicine) agricultural sciences, all kinds of engineering, most applied research and development associated with industry, and social sciences. This is reflected in the statutes of the National Science Council and of the Ceylon Association for the Advancement of Science (see ref. 3 and Appendix III).

b) Information: This is a notoriously ill-defined concept which is bound to cause confusion. From the point of view of an I&D-Centre, the information provided is the content of the materials (documents, bibliographies, data etc.) supplied in response to a request. It is a matter for the user to assess the comprehensiveness, relevance and consistency of this material, since this is determined uniquely by his relationship to his own research problem. Improvement of information supplied is achieved by a process of feedback, whereby the user response is taken into account in subsequent searches.

The concept of "information" here will denote materials pertinent to S&T, and disseminated within the international scholarly or professional community, delimited by the definition above of "Science and Technology".

4.2 The research community of Science and Technology

This community consists of individuals actively involved in systematic, organized inquiry ("research") in areas within the definition of S&T. Research in the public sector reaches across the domain of most ministries (ref. 4) through various agencies and research centres. Consistent statistics are generally lacking, but a fresh study of research manpower in Sri Lanka (see Appendix I, including also non-S&T areas of academic research), indicates that the community of active researchers is not larger than roughly 900 of whom some 2/3 are senior research staff. This figure points at one of the essential challenges: that of producing an effective I&D service without spending an unjustifiably large part of the total research budget. It is a fact that the present expenditure for research libraries and information services engages no lesser part of the total expenditures for research than is the case in large systems, only that this part is in absolute measures too small to support a viable system of S&T information provision required for research on the international level. The manpower study referred to also shows the extremely strong dependence on foreign education on the post-graduate level. In some areas ("hard sciences") practically all senior academic teachers (lecturers, professors) have Ph.Ds from universities abroad (a feature that also relates to the problem of brain-drain). Also, the number of post-

graduate programmes on master level is limited, and only very few doctorates are absolved at Sri Lanka universities at present. This is one of the reasons for the low number of research students. In the present structure of the research system, a larger part of the work is performed in institutions outside the universities, and even university-based research is to a non-negligible extent to be described as "applied". These are factors that have to be taken into account in designing a system for S&T information provision.

4.3 The research system

The institutional framework for research in Sri Lanka consists of the universities (seven autonomous units since 1 January 1979, an eighth being projected) and a large number of research institutions, mainly in the public domain, covering specific sectors or areas. The main task of universities is undergraduate education. The research institutions have a number of functions other than research, like information transfer, extension service, training, field studies, pilot studies, consulting etc. The total system of research proper is very small, even if the concept is understood in a wide sense. A recent estimate obtained in a NSC study for 1975 (ref. 10) of the total annual expenditure on R&D in Sri Lanka (although apparently excluding administration overheads, libraries, foreign aid grant etc.) amounts to about 33 MRs.

The universities have very limited resources for postgraduate training (master's and doctoral levels). A majority of doctorates are obtained from foreign universities as a result of scholarship-financed studies abroad. Of the total research output at present in Science and Technology, a dominant part is to be regarded as applied or development work. Also university research frequently has a touch of applied research, which certainly is related to the provenance of research funds and to the procedures of grant-allocation.

It is not possible to find simple indicators for overall quality ("standard of exellence") of research even in well-defined areas. However, one criterion of the "interest" of a research result is that it should relate to the corpus of on-going research and not constitute an isolated fragment. Since science is an international venture and the internal links should (by established praxis) be accounted for by means of references, the statistical distribution of citations carries some weight in the assessment of a research system. I have made a brief study on reference age in Sri Lanka research journals for a number of different areas, obtaining the following rather surprising results:

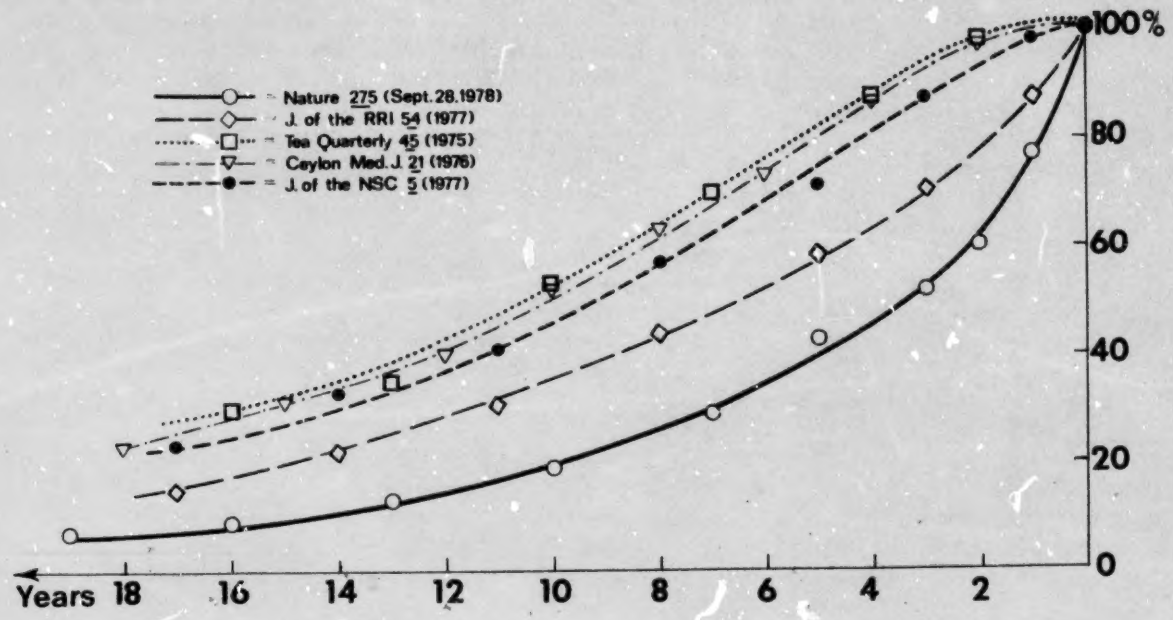


Fig. 1. Integrated distribution of reference age (not corrected for auto-citations) in Sri Lanka research journals. The ordinata for a point on a curve gives the percentage of references older than the abscissa reading. (Work performed in collaboration with Miss I.R. de Silva (SLSTIC)).

For comparison, a curve has been plotted for one issue of "Nature" which is, as expected, strongly peaked near zero age, the 50% level being attained at about 3 years. Here the areas "Medicine", "Biology", "Biochemistry" and "Physics" have been merged - it is possible that slight differences would appear if sufficient data were assembled for each area.

However, as compared to the Sri Lanka journals the difference is quite obvious, the latter yielding curves that are notably less peaked. (Admittedly the comparison is a bit unfair, since "Nature" is a typical "letter"-journal, where contributions might tend to center on "research-front" relationships. For the present purpose this reservation is not very important.)

Most journals trace almost linear curves over 12 years back, reaching the 50% level at about 9-10 years. A somewhat better trajectory is traced for the "Journal of the Rubber Research Institute of Sri Lanka", which lies closer to Nature and reaches the 50% level at about 7 years.

The diagram gives clear evidence in support of the conjecture that research in Sri Lanka is too weakly linked to the international research front (as represented by the international literature). Many contributing reasons come to mind, here listed without ranking:

- Special research problems, weakly related to international research.
- Too narrow definition of research programmes.
- Weak personal links with international research community.
- A defensive attitude, due to difficulties in pursuing research, mentally reducing the relevance and value of other results.
- Insufficiant library holdings of important literature and abstract journals.
- Inadequate I&D service (e.g. not providing comprehensive individual-oriented retrospective and current-awareness searches).
- Inadequate awareness of I&D services and how to use them.

(Presumably, on the postgraduate research level, difficulties in reading English should not be a restricting factor.)

Most likely these factors will enter with different weight in different areas. It will, however, be obvious that most of the factors are related to information services and training in their use, and to the (psychology of) attitudes with respect to information transfer. Counter-measures therefore can be introduced both in development of adequate services and in training. The training should not only centre on I&D services proper, but also give a general understanding of the functioning of the international scientific system. These aspects are included in suggestions given in the chapter on "Functions for SLSTIC" (2.4, cf. also Ch. 9).

A brief remark might here be added on the better shape of the age characteristic for citations in rubber research. This may be related to the fact that the area is rather limited, and that few leading institutes, among them the RRI of Sri Lanka and the Malaya RRI, totally dominate research which is furthermore pursued in co-operation. The same argument should then, qualitatively, be equally valid for tea research. However, I have been told that, for reasons of market competition, this is an area with little research co-operation. A search on the data-bases "Pascal", "Chemical Abstracts Condensates" and "Biosis", performed by the Information and Documentation Centre (IDC) of the Royal Institute of Technology Library in Stockholm (Dec. 1978) shows that the literature on tea research is well represented in computer retrievable media even including Russian and Chinese contributions.

4.4 The University sector

The distribution of faculties in Sri Lanka Universities along with some statistical data is presented as a matrix in Appendix I. It should be noted that, for reasons of variable delimitations in the statistical data available, social sciences and arts have been merged. As of Jan. 1, 1979, the new university organisation becomes operative, whereby the different units (campuses of the "University of Sri Lanka", united in 1972) have been given the status of autonomous universities.

A number of changes in names have taken place, shown in the following table, which also gives the distribution of faculties:

		Distribution of faculties					
U. of Sri Lanka Campus	University	Arts & Soc.Sc.	Nat.Sc.	Engin.	Agric.	Vet.Sc.	Med.
Peradeniya (1942)	Peradeniya	x	x	x	x	x	x
Colombo (1967)	Colombo	x	x				x
Katubedde (1972)	Moratuwa			x			
Vidyalankara (1959)	Kelaniya	x	x				
Vidyodaya (1959)	Sri Jayawardenapura	x	x				
Jaffna (1974)	Jaffna	x	x				
Ruhuna (1978)	Ruhuna	(x)	(x)		(x)		
Batticaloa (projected)							

Table 1: Distribution of faculties in Sri Lanka Universities.

Unfortunately, there is no up-to-date comprehensive information available on the research activities in the University of Sri Lanka. Only one annual report, that for the initial year 1972 (ref. 23) has been published (1977). The Moratuwa University of Engineering (formerly Katubedde Campus), created in part by UNDP and Unesco projects, is discussed in an analytical Unesco report from 1972 (ref. 24). The development of University policies in Sri Lanka has recently been reviewed (ref. 31).

4.5 Research Institutions

As mentioned earlier, the resources for basic research are very limited. A recent compilation of research papers (ref. 20) restricted to "basic science" lists 2335 items for the period 1960-1976. This figure, however, includes some material of distinctively applied nature, many conference notes from proceedings of SLAAS, and probably some items where research was performed abroad.

A remarkable addition to basic research has been announced in a Government press release, published on 18 January 1979. In the near future a new research institute devoted entirely to theoretical and empirical fundamental research in natural sciences will be created with the ambition of becoming an international centre of excellence. This will obviously imply a demand for I&D services on an equal level (a challenge for SLSTIC) from which other research will undoubtedly also benefit.

As reference material for subsequent discussions of Library and Information Services, a few institutes and organizations in the research area are described in Appendix III by auto-presentations, mainly drawn from ref. 17. It should be noted that the institutes in general have their own library facilities. Some of them have quite extensive and sophisticated (albeit "conventional") I&D services covering the area or sector of specific interest to the institute (cf. 6.3.2).

4.6 Some aspects of economy

The general level of salaries appears to be extremely low when simply converted to $, (official exchange rate about Rs. 15 = 1 US $). An unskilled worker would earn 200-300 Rs./month, a typist perhaps 400, a library assistant from about 500-700, a documentation or research officer from some 750-1000 and a university professor som 2000. Resources for commodities are of the same order of magnitude as those for emoluments. Understandably, any acquisition of material and any external service to be financed in hard currency will seem unqualifiably high compared to alternative use on the Rs.-market. A 4000 $ photocopying machine corresponds to ten man-years of clerical staff - it is cheaper to retype a manuscript needed in five copies, than to make photocopies!

Since S&T literature must to a large extent be imported, some curious characteristics follow. Students as a rule do not have own copies of foreign text-books, and therefore depend totally on libraries; This is most marked of the post-graduate level where foreign literature is indispensable. Even a non-profit rate for photocopies would make a "household" use of journal copying questionable if it were to be paid from the researcher's own pocket. The problem inherent in this situation is to introduce improvements in the research system using foreign-aid resources but in a way not unnecessarily to increase the dependence on further expenditures in hard currency to uphold the new level of operation. However, as the research system grows with increasing demand of skilled labour, the size should eventually reach a level where the S&T research system can support its information services on a reasonable fraction of its budget.

The disproportions become virtually dramatic when it comes to the use of advanced equipment. A powerful minicomputer may require an investment of about US$ 100.000 (cf. 7.4). Even if it can be acquired on foreign aid funds, the annual expenditure for a service contract (which is absolutely indispensable) will amount to

around US$ 10.000, equivalent to about Rs. 150.000. This corresponds roughly to 15 man-years on research assistant level, whereas in a country like Sweden (where the employer pays about 45% on top of salaries for social costs) it would correspond only to six months' salary on the same level. Yet the computer can perform operations that cannot be done manually even with a large skilled staff. Where the computer represents a non-substitutable resource, the only alternative is to be content with a lower level of performance. In the case of I&D services to research this may considerably hamper the working conditions of research staff, in particular in a small system where few alternatives to literature are available to get information. The effect of too low ambitions in I&D services can be a low efficiency in the use of the research funds at large.

4.7 Language problems

There are three official languages in Sri Lanka: Sinhala, Tamil and English. Sinhala is the mother-tongue of a large majority of the population, some 80%, while Tamil is the mother-tongue of the main part of the remaining 20%. Only few persons can speak both Sinhala and Tamil, which makes English lingua franca. All official documents are (supposed to be) published in all three languages. However, English is not really mastered by other than members of the upper and middle social strata, a minor part of the population. Further, due to educational policies in the 60s and 70s the emphasis on English studies in school was greatly reduced. The effect is now obvious in the students entering universities and other institutions of higher education, a majority of whom are not in possession of a working knowledge of English. This is one contributing reason for undergraduate courses being held largely in the Sinhala and Tamil idioms (depending on the location), limiting literature to local publictions, compendia and lecture notes. In fact, a large number of undergraduate visitors to university libraries do not use the library's collection of scientific literature, but merely use the library as an attractive environment for study of materials of the type mentioned.

Knowledge of English is to-day an indispensable pre-requisite for research in Science and Technology, since it gives access to a majority of the important research journals and reference publications, and thereby also dominates the more advanced I&D services available. The linguistic deficiencies in the cadres of students is to some extent remedied by crash programmes in English. (The British Council is just now building a new "English training institute" to be opened in 1980, presenting a flexible programme of courses for different needs.) Yet at present a clear social bias in the selection of students qualified for foreign scholarships is unavoidable. The majority of students leaving university after their basic degree will in most cases never have come in contact with the world's scientific literature and will therefore not really be able to profit (other than in exceptional cases) from I&D services pointing particularly to the literature of areas where they ought to keep up-to-date.

It is possible that the inclusion of courses in the use of library and documentation services on the undergraduate level, now common in many Western universities, would give incentives for more active continuous self-education within profession (cf. 7.2).

A particular library problem related to the language situation in Sri Lanka arises from the lack of standardization in transliteration. This becomes apparent when, for example, Sinhalese family names of authors are to be entered in library catalogues and reference files. A name like Gunetilake could well appear in variants with 'u' replaced by 'oo', 'l' and 'n' by 'll' and 'nn' respectively, and 'a' by 'e' or vice versa - a total of 64 different combinations.

5. RESEARCH LIBRARIES I: FINANCING

5.1 The library system

The basic and indispensable source of scientific and technological information is the literature in the form of primary sources (monographs, journals, reports), and secondary sources (abstract and index journals, reviews, documentation services). It is obvious that in a small system, where the total funds for S&T information provision are not sufficient to maintain a satisfactory library collection, even when regarded as a united resource within the country, other sources of information, like computerized I&D services, will be regarded as luxuries or will even be useless unless backed up by further, mainly external, means (like photocopies from large foreign libraries).

The National Library Services Board (see Appendix III and V) has in principle a wide-ranging responsibility with regard to the entire library system, of co-ordination, development and ecucation. It has, however, so far neither the resources nor the authority to fulfil all its formal duties (it has not yet even got a building to house the National Library and its collections (for plans see ref. 25)). It concentrates its efforts on producing the National Bibliography and to development programmes and an advisory role in the area of public and school libraries. These two categories fall under the heading of the local administrations and the ministry of education respectively. As to research libraries (and professionally oriented libraries in general), they fall under the heading of the Ministry of Higher Education (universities) or different sectorial ministries to which the institute or department is tied. (Private enterprise libraries are of course independent.)

The directory of research libraries in Sri Lanka (ref. 16) lists questionnaire responses from 55 units, from small institutional collections managed by one or two persons to university libraries with staff of more than 80. In some cases university faculty libraries are listed separately, in other (relevant) cases this is not done, e.g. the Moratuwa (engineering faculty) library, and the engineering and medical faculty libraries and chemistry department library at Peradeniya. The total number of library units of some importance (including some private enterprise libraries) is probably of the order of 120 (cf. also ref. 17).

A number of questions asked during the study visits of the present mission have shown that the information given in response to the questionnaire is frequently unreliable. This is the case concerning the size of collections and the number of current journal titles. Questions had in some cases been too unspecific (no distinction made e.g. for journals subscribed to or received as gift or in exchange). The information on equipment was in most cases incomplete and frequently erroneous. The questionnaire did not ask for information on allocations for acquisitions (periodicals and books), nor for estimates of the value of "external" sources, like the ODM (British Council) and the Netherlands literature programme, or grants associated with current R&D projects supported by foreign aid funds (cf. 5.3).

Some effort was spent during the visits to get a more comprehensive view of the overall situation. The result is presented in tabular form (table 2), where some data, like expenditures and acquisitions have to be taken as uncertain. Estimates of collection size could not be verified. Data on usage were generally not available. There are exceptions, notably the meticulously well documented services from the CISIR library. Annual reports are often lagging behind in time (for the united University of Sri Lanka the only annual report published is the one of the initial year 1972, published in 1977, ref. 23). A general conclusion of this work is that a co-ordinated programme for library statistics is needed as a basis for a progressive library policy. The SLSTIC might well be entrusted to develop a standardized formula, consistent with the Unesco/IFLA recommendations, and to act as a secretariat for collecting and analysing such data cf. 2.5 and 6.3.1).

Some features immediately come to mind when glancing at this table. Most libraries are fairly young, (in fact most of the older ones are included in this sample).

Affiliation of Library	Year of establ. of libr.	Library Staff 1977	alloc. for libr. acquisit. 1977 (in 1000Rs.)	current journal titles foreign subscr.	current journal titles gift/exch.	sectorial doc. service	photocop. equipment for libr. serv.	printing equipment within organiza.	Comments marked (-) refer to organization, not specifically to library
Agrar.Res. & Training Inst.	1972	3	100(J) 30(B)	150	15/10	yes*	Nashua 1220S (July '78)	yes	* I&D center projected - Gestetner 211 (offset) (1976) - Ideal Forte Guillotine - Microfiche camera (Dogmar) (Netherlands) - Video equipment Sony
British Council* (Colombo)	1951	20	-	180	none	no	Nashua 220(1976)	no	* Only partially in Science and Technology
Central Agri.Research Inst.	1810*	4	none	none	300	no	no	yes	* Prominent collection of older literature - Nashua 1210(1978), Mita Copystar 900(1978) and Gestetner 208 offset(1978) bought by Botany dep. - Publ. "Tropical Agriculturist"
Cey.Inst.of Sci. & Ind.Res.	1955	12	140(J) 40(B)	200	500*	yes	Savin# (1974)	no	* Only 100 shelved as relevant # Same as Nashua 220
Coconut Res.Inst.	1930	2	80(J) 40(B)	107	220*	yes#	no	no	* Only 40 shelved as relevant # Project for doc.center recently approved by IDRC - Publ. "Ceylon Coconut Quarterly"
Dept.of Census & Statistics	1947	6	10(B+J)	21	585	yes	Nashua 220	yes	- Advanced offset printing equipm.: Composer (Headliner 820), Camera (Lithotex 25), Offset Heidelberg GTO, Polar Guillotine
Industr.Dev.Board	1968	9	60(B+J)	75	90/10	yes	Nashua 1210, 3M	yes	- Advanced offset printing equipments: camera (Rotaprint), Electrostatic plate-maker(1970), Rotaprint R90/35 and R30/90(1975) - Publ. "Karmantha" etc.

National Museum *#	1877	14	10(B+J)	32	770/-	no	Bandarve-lop + Bk 22(1976)	no	* Dep. for printed material in Sri Lanka # Only partially in Science and Technology + Equipment using pos/neg. photogr. material - Publ. "Spolia Zeylanica"
Rubber Res.Inst.	1910	6	30(B) 65(J)	100	150/30	yes	no	no	- Publ. "Rubber Res.Inst. of Sri Lanka (Quarterly Journal): Bulletins etc.
Sri Lanka Medical Library*	1843	5	64(J) 5(B)	92	19/6	yes**	Nashua 220# (1976)	no	* Lib. of SL Med.Assoc. ** Manual literature searches # c:a 2000 copies/month
Sri Lanka Sci. & Tech.Inf.Centre (National Sc.Council)	1971	13	60(B+J)	54	63/52*	yes**	Mita Copystar 900(1970)	yes#	* 41 exch.for J.of NSC, 11 for "Sc.Index" ** Union Catalogues, Bibliographies and Doc.Services are main activity along with co-ordination of research library services. Implementation of Unesco-supported program for development of I&D-services in Science and Technology in progress - Publ. "J.of the Nat.Sci.Council of Sri Lanka", "Vidurava" and "Sri Lanka Journal of Soc.Sciences" # Ricoh 1010 (Jan. 79)
Tea Research Inst.	1928	2	200(J) 80(B)	130	50/60	no	Nashua 1220(1978)	no	- Publ. "Tea Quarterly"
Colombo Univ. Main Library	1921	68	210(J) 185(B)	360	395	no	no*	no	* Only in Dean's office - Publ. "Ceylon Journal of Medical Science"
Medical Fac.Libr.*	1955	(6)	(68(J)) (25(B))	(150)	(110)	no#	no	no	* Figures in brackets included in main library figures # Channelling Medline searches at WHO through New Delhi

Peradeniya Univ. Main Library	1921	89	550(B+J)	750	400	no	no	no	- Publ. "Ceylon Journal of Science: Biol.Sciences", "Ceylon Veterin. Journal" - Depository for printed material in Sri Lanka
Medical Fac.Libr.*	1965	9	(260(J) 25(B))	(164)	(35)	no	no#	no	* Figures in brackets included in main library figures # Channelling Medline searches at WHO through New Delhi
Engineering Fac.Lib.*	1965	5	(75(J) 20(B))	(106)	(16/-)	no	no	no	* Figures in brackets included in main library figures
Moratuwa Univ. of Engineering (Katubedde)	1972	34	300(J) 200(B)	350	?	no	Nashua 1220(1977)	no	

Although the university libraries have a large staff, their allocations for acquisition are very small by "Western" standards. The total expenditure for literature acquisition in the libraries listed is of the order of 2.5 MRs (less than 200.000$). The total number of journal subscriptions (including multiples) is less than 2.500. Very few (and recently installed) plain-paper photocopiers (Nashua 1210 and 1220) are available for library use. All these features will be dealt with subsequently.

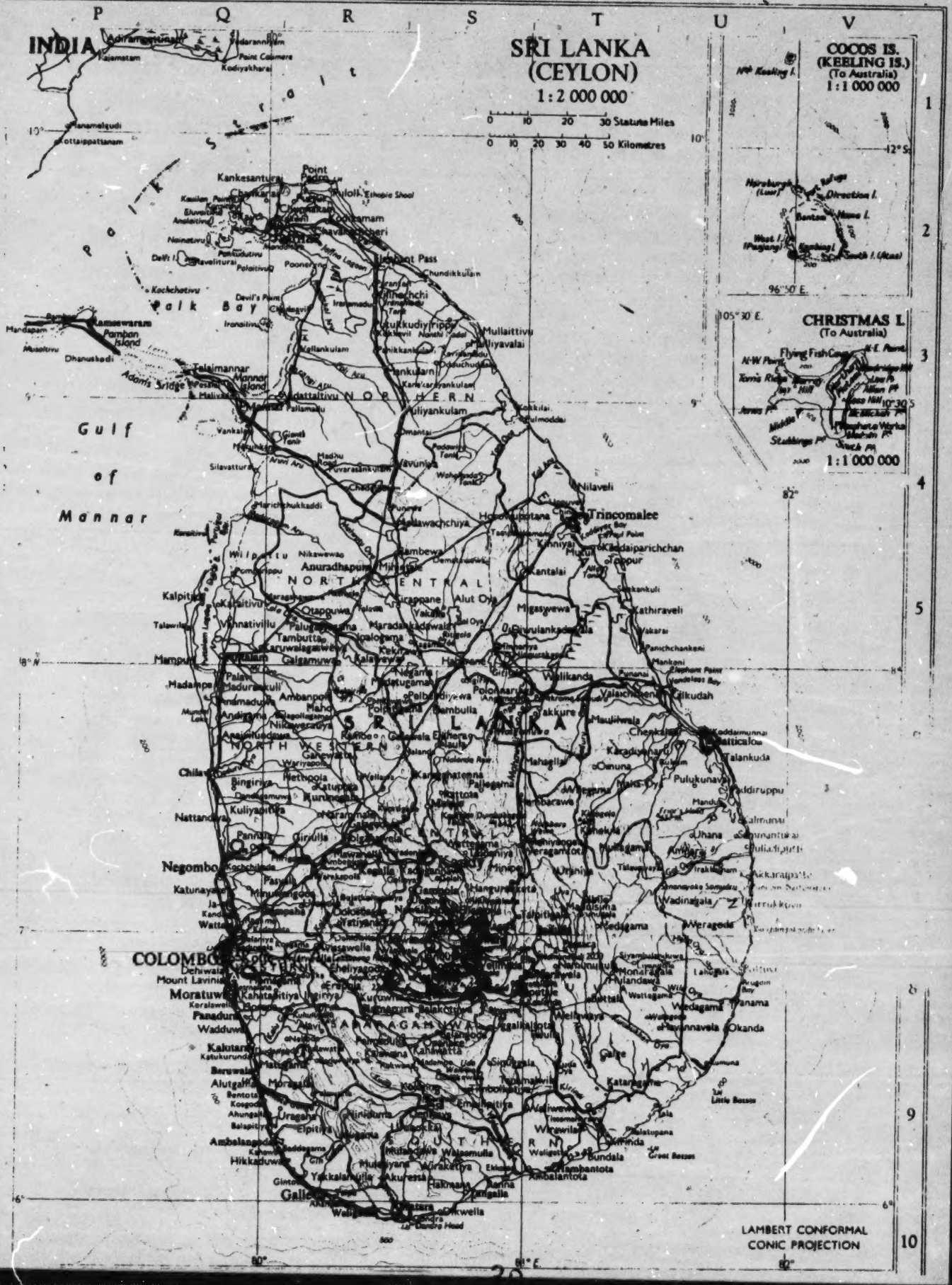
5.2 The regular allocation for acquisition of literature

The major component of library funding is necessarily the annual allocation within the regular budget. Research libraries in Sri Lanka have to operate with extremely small appropriations in relation to their responsibilities, a natural aspect of the "small system syndrome". Yet the total amount spent on S&T literature (in hard currency) is no less a part of the total funds for R&D than is regarded as normal in larger systems, in the country. (The figure of 2.5 MRs and about an equal amount for cost of staff and administration should be compared to the total expenditure of probably no more than 40 MRs spent on R&D in 1978 (cf. Appendix I), i.e. exceeding 10%. If elementary foreign literature for the undergraduate level is left out of consideration (and such material is not much used due to the language barrier (cf. 4.7)) the main consumer of current literature is the postgraduate student and the researcher, of whom there are very few individuals in any specific research area and location (see Appendix I and staffing figures in Appendix III). Even very generous per capita investment in literature is simply not enough to support a comprehensive library.

Two events are important in an assessment of the present library situation. First, due to a general financial crisis in 1972-73, library funds were cut practically to nil with the effect that a large part of the journal sequences have a gap of two years, hardly reparable later since journals rapidly go out of print. Secondly, although allocations were later partially restored (though as a rule not to the pre-crisis level), in 1977 the Rupie was subject to a 50% devaluation with respect to the US $. (At the same time a 50% import tax was abolished, from which books had, however, already been exempt.) Most librarians claim that no compensation was given although practically all scientific literature has to be brought in from abroad. (Only the library of Moratuwa Univ. of Engineering asserts having received upgrading.) The net effect has been that a large number of journal titles had to be discontinued. Peradeniya University library, for example, reduced its foreign subscriptions from 1600 (in 1971) to 750 (in 1978), and Colombo University library from 800 to 360 titles. Further, a number of important abstracting and indexing journals had to be reduced to a single subscription (see ref. 15), which causes a constant worry for researchers working in a place distant from these information sources (cf. fig. 2) or renounced to completely. Yet, again with reference to the small size of the system, the total number of users in each area is not larger than would normally justify a single subscription, the problem here being the dispersion of the users. Another effect is that to avoid further cuts even in high-priority subscriptions, the purchase of books has been reduced, sometimes almost to nil.

In the context of a discussion of a joint acquisition programme (cf. 6.2 and Ch. 2) it should be possible to design a centralized "look-out"-programme to fill the gaps in sequences, and in certain cases even to bring discontinued series up-to-date.

In the Western industrialized countries there has been a continual inflation over the years, which wil undoubtedly continue in the foreseeable future. A large part of the scientific literature to be acquired by the research libraries in Sri Lanka originates from this region. Therefore it will be necessary to take the pricing developments into account in the annual budget estimates (and in allocations) if the present level of library standards is at least to be upheld. A continued failure to compensate for inflation and currency variations might in few years give rise to a new library crisis. An annual index for budget compensation may easily be calculated on the basis of acquisition statistics. This might become the task of a central unit dealing with matters of library statistics in general (cf. Ch. 2).


P
Q
R
S
T
U
V
INDIA
SRI LANKA
(CEYLON)
1:2 000 000
0 10 20 30 Statute Miles
0 10 20 30 40 50 Kilometres
COCOS IS.
(KEELING IS.)
(To Australia)
1:1 000 000
CHRISTMAS I.
(To Australia)
1:1 000 000
Palk Bay
Gulf of Mannar
Adam's Bridge
Pamban Island
Mandapam
Rameswaram
Talaimannar
Mannar Island
Point Pedro
Kankesanturai
Elephant Pass
Jaffna Lagoon
Devil's Point
Kodikchotivu
Pooneryn
Chundikkulam
Mullaittivu
Nilaveli
Trincomalee
Kaddaiparichchan
Kantalai
Kathiraveli
Batticaloa
Talankuda
Pulukunavu
Kalmunai
Uhana
Akkaraipattu
Veragoda
Wadinagala
Wedagama
Panama
Okanda
Galle
Kataragama
Little Basses
Great Basses
Bundala
Hambantota
Kirinda
Weligama
Matara
Dondra Head
Point Calimere
Kodiyakkarai
Vedaranniyam
Talaimannar
Kayts
Jaffna
Kilinochchi
Mullaitivu
Trincomalee
Batticaloa
Anuradhapura
Kurunegala
Negombo
Colombo
Moratuwa
Panadura
Kalutara
Galle
Matara
Ratnapura
Kandy
Nuwara Eliya
Badulla
Hambantota
Kalpitiya
Puttalam
Chilaw
Mannar
Vavuniya
Trincomalee
Batticaloa
Kandy
Nuwara Eliya
Ratnapura
Badulla
Galle
Matara
Hambantota
Colombo
Negombo
Kurunegala
Anuradhapura
Puttalam
Chilaw
Mannar
Vavuniya
Jaffna
Kayts
Kilinochchi
Mullaitivu

5.3 Other sources for literature acquisition

Apart from the "brute force" method of purchasing literature, there are other sources and ways which, in the small system of Sri Lanka, have a considerable impact. In this context an important budgeting principle has to be observed by the receiving institution, in case the "source" is regarded as derived from "foreign aid" (see Appendix II).

According to present regulation, all foreign aid has to be channelled through the Ministry of Planning and External Resources. This means that aid programmes have to be planned well in advance, and the budget estimates of the receiving institution delivered in a certain year have to include grants expected for the following year. For literature programmes, which operate on an ad hoc basis, this turns out to be practically impossible. This is mainly due to the management procedures of these programmes, whereby no absolutely definite "roof" is given for each institution, unless an exaggerated guess were to be entered into the budget estimates (which might on the other hand induce authorities to cut the "regular" appropriations). It would of course be possible to use the emergency option provided by the law (see appendix II), but this would imply a lot of paper-work for all the institutions involved and in particular for the Ministry of External Resources. Further, the local administrators directly involved, librarians and department heads, do not generally seem to be aware of the formal requirements. The net effect of not handling these grants according to the budgeting regulations (although they are - and are perceived as - outright gifts) is that the institution has to pay to counterpart funds from their regular allocations for the materials received. In blunt language this means that in practice they will have no economic advantage from the foreign literature programme, while they will suffer from the disadvantage of a complicated and restrictive way of acquisition instead of using their funds (which were anyway designated for foreign literature) in the ordinary way.

5.3.1 The Netherlands Literature Programme. This is exactly what has happened in the case of the Netherlands Literature Programme, which generously set up the amount of DFl 1M (about 6 MRs) for the period 1975-77 to be used entirely for advanced literature to Sri Lanka libraries. At the end of the period (autumn 1978) about DFl 790.000 had been assigned to universities and the rest to Government departments and research institutions. Claims for repayment to counterpart funds are still pending. The Netherlands also maintains a continuing literature programme, whereby DFl 1M are available annually to all countries involved in the scheme. No particular provenance for the literature is required, but, to avoid long-term commitments, journal subscriptions are granted for no more than two years (cf. 8.3).

5.3.2 The Overseas Development Ministry (ODM, London) entertains a continuing programme for dissemination of Scientific and Technological literature. In Sri Lanka the programme is administered by the British Council. At present about £ 35.000-40.000 per annum are spent for advanced literature to Sri Lanka libraries (about 1 MRs). There are restrictions: The literature should be published in the U.K.; only single copies are supplied; periodicals are subscribed to for no more than two years (to avoid long-term commitments); priority is given to programmes sponsored by the British Council, British Universities or agencies, or associated with the work of British academic staff in Sri Lanka Universities or research institutions. For some unexplained reason, probably having to do with the status of the British Council as an information service organization receiving foreign materials under special conditions, this programme seems to be exempt from the budget estimate and counterpart fund procedures in principle obligatory for all foreign aid (cf. Appendix II). Under the ODM literature program it is also possible to obtain coupons for the photocopy service offered by BLLD. Amazingly, this possibility is little used, in spite of the manifest need of a substantial back-up service for journal articles not covered by local library

holdings. The only possible explanation is a too weak effort in publicizing this service, which indicates a need for increased service-mindedness in libraries (cf. Ch. 9).

5.3.3 The American Centre in Colombo has occasionally supplied rest-stocks of outgoing editions of US textbooks on college and university level. This is a mixed blessing since the reason for bringing out new editions is normally that the older ones are out of date. Of course with the present lack of funds, and considering that students normally cannot afford to own any foreign textbooks at all, it is certainly a welcome addition to the literature supply.

5.3.4 A related scheme (although not as grants) is the Joint Indian-American Text-Book Programme, administered by the International Communication Agency (US) and the Ministry of Education (India). The programme was established in 1961 and has to date released about 1500 titles. The principle is to publish student's editions of well-known textbooks from participating publishers associated with Western scientific press. Among the participants are for example Macmillan Co. of India, Oxford University Press in Delhi, Prentice-Hall of India, Tata McGraw-Hill, and Wiley Eastern Ltd. A number of classics appear in the list, e.g. the famous "Methods of Mathematical Physics" by R. Courant and D. Hilbert (over 1400 pages, priced 65 Rs, about 4$), the original German version of which was written in the thirties. Most of the titles are in fact reprints of relatively old publications, as a rule more than 10 years old. Prices are manifestly low.

5.3.5 Of a somewhat different character (again not as grants) is the USSR programme for translation of university textbooks and monographs in Science and Technology. A large number of excellent works, some of them quite recent, are currently published in English and French at extremely low prices. As is often the case with USSR literature, the marketing is not sufficiently strong to make these editions wide-spread.

5.3.6 The Federal Republic of Germany provides one set of the important chemistry handbook series

Gmelin: Handbook of Inorganic Chemistry
and Beilstein: Handbook of Organic Chemistry

These are extremely expensive (some 18.000 DM for Gmelin and some 16.000 DM for Beilstein in 1978), yet indispensable for research in chemistry. This is the only set available in Sri Lanka, placed in the chemistry department library at Peradeniya University. It is probably obtained through personal contacts by the head of department.

5.3.7 Within a number of R&D projects with foreign grants from organizations like WHO, FAO, Unesco, IDRC and SAREC, a certain amount is often available for library support, both as literature and equipment. Sometimes advanced equipment, like photocopying or offset-printing, will be "owned" by a particular grant-receiving department or institution within a larger organization, whereby the equipment will not always be utilized to its full capacity in spite of imminent needs. This is a problem of project management which could be easily solved once it has been brought to attention.

5.3.8 Depositories. The national production of printed materials is deposited as free copies to four institutions: The National Archives, the National Library Services Board, the National Museum Library and Peradeniya University Library. The materials are documented in the periodical "Sri Lanka National Bibliography" published by the SLNLSB.

Since 1977 SLSTIC is building up a collection of administrative and technical reports issued by S&T institutions in Sri Lanka, and also seminar and conference documents and reports issued by individual research workers. The general idea is to create a national depository for work performed in the country. A network of more than one hundred officers have been nominated by institutions concerned, to be responsible for sending material as it is released. So far, the comprehensiveness of the collection depends on the co-operative attitude of individuals and cannot be enforced by any authorization, like the delivery of printed materials to depository libraries. A problem to solve is of course to find a suitable characterization of the depository and to define objectives for its development, since the "grey literature" collected does not constitute an easily recognized subset of the flow of official or semi-official documents.

The item selected for filing are indexed in broad categories according to the UDC system. A nominal catalogue (alphabetic on authors) and an analytic catalogue (organized according to subject headings used for indexing) in card form are built up at SLSTIC. In addition, articles in local S&T journals are indexed in the same way, as are also articles dealing with S&T in local newspapers. The catalogue cards for journal articles are filed along with the cards for the reports depository in the analytic catalogue. Material assembled in a three-month period is retyped and published as an issue of the quarterly "Sri Lanka Science Index". An issue (1978) lists about 250 items.

It is clear that considerable advantage could be obtained in the long run by computerizing the file, since a number of different (cumulative) lists and catalogues could be produced with little extra work. By slightly different editing the volume of the issues of "Science Index" could be much reduced, in particular if combined with photographic reduction and offset-printing.

5.3.9 The gift-or-exchange system. A further source of acquisition is rendered by the gift-or-exchange system for periodicals (and certain other publications). A large number of news bulletins, report series (and single reports) and certain journals (published by non-profit organizations) are sent out free of charge for various reasons (professional contacts, information dissemination programmes, foreign aid programmes, publicity, marketing, or for simplicity - sometimes in anticipation of similar gifts). It is seen from the table of libraries (table 2), that quite a few titles are obtained in this way. Since no control of the selection can be exercised (except formally requesting to be omitted from mailing lists) inevitably a good part of the material is of relatively low utility. It should be kept and catalogued only selectively, (sometimes sent on to individuals known to take a particular interest in the matter).

A very important source is provided by the journal exchange system, whereby research journals are obtained mainly from scientific associations, research councils and institutions having their own publishing activity and library. Sometimes libraries purchase a part of the edition of a local journal with the immediate intent to use it for exchange. (This has the dual advantage of supporting local publications and offering a means of acquisition without currency transfer.) Since exchanges are based on agreements there is a certain possibility to select the titles to be received. The main prerequisite is to have a high-quality product to offer. A number of Sri Lanka journals, like the Journal of the National Science Council, the Tropical Agriculturist (CARI) and the Sri Lanka Journal of Rubber Research, are responsible for much of the exchange success of the corresponding institutions. However, it is likely that the total output of research journals in Sri Lanka could be more efficiently used if a pool of material were available to the entire library system instead of each institution using only its own publications. A scheme for sharing the costs appropriately could certainly be worked out, in particular if a joint acquisition programme, as is hinted at in the chapter on "Functions for SLSTIC" (Ch. 2), would materialize. The idea of an editorial secretariat (same chapter), for upgrading the standard of excellence of scientific publishing and consolidating the editorial processes and contacts with

printers, is conceived to further increase the value of the journals as a substitute for foreign currency.

5.3.10 Memberships. A source of some importance is provided by societies and organizations, whose publications are obtained free or at reduced rates, as part of the membership benefits. (Sometimes there are, in particular for individual memberships, restrictions as to the library use of such materials.) The participation of the Research Department of the Ministry of Agriculture in the CAB (Commonwealth Agricultural Bureau) information services programme renders a total of 108 subscriptions selected from the 21 series of abstract journals published by CAB (some further being obtained by libraries on an exchange basis). The US Government Reports Announcements (GRA) are obtained free by SLSTIC in its capacity as a national focal point for reports procurement from NTIS. The membership of IDB in TECHNONET (6.3.4) should also be considerd in this context.

5.4 Purchasing procedures

The last point to raise here concerns the procedures for acquisition of foreign S&T literature. Before 1977, due to the hard restrictions on foreign currency, the libraries were compelled to use the local bookshops as intermediaries. This puts very great demands on bookshop staff and management which are hardly met (as far as can be judged from an inspection). Quite generally in countries with only a small fraction of the population reading foreign books, the bookselling system is not capable of dealing with the intricacies of the S&T literature production system in an economically competitive way, and without undue delays. An idea by the British Council, a couple of years ago, to start or sponsor a university bookshop in Colombo seems to have been dropped, possibly for policy reasons. (There was also the cumbersome possibility for an institution to apply to the government for permission to make transfers to a foreign bank account for book acquisitions.) As the restrictions were relieved, the greater part of foreign acquisitions (an informed guess indicates something like 75% at least) now proceed through foreign bookshops (primarily in the U.K.) or directly to publishers (generally without discounts). The University libraries in Colombo and Peradeniya seem to order all their literature from Blackwell's in Oxford (books and periodicals). Other libraries use services from H.W. Lewis & Co. or Bumpus, Haldane & Maxwell Ltd. in London (books and periodicals). Many journals are subscribed to directly from publishers, in particular US journals. Both Blackwell's and Bumpus, Haldane & Maxwell offer computerized "current-awareness services" defined according to the subscriber's profile of interests, the latter being used by SLSTIC for their "book alert service" to Sri Lanka research libraries. Apparently Netherlands and German publications are generally obtained from U.K. booksellers, and also most books from the U.S., which surely causes a considerable increase in cost as compared to direct channels.

At present libraries as a rule follow a rather awkward and time-consuming routine in ordering literature. A first selection is made by the acquisition department (possibly in co-operation with scientific advisers). The list is submitted (often only at 3-months interval) to the foreign bookshop for inquiry of availability and exact prices. A pro forma invoice is sent back to the library. After a final selection, where some titles may be deleted, the final order is sent off, and simultaneously a payment order is sent to the financial administration for transfer of the correct amount. When the amount has been credited to the library's account with the bookshop the literature requested is sent on (or even first ordered from the publisher) and subscription orders are forwarded to the journal publishers. If, at that time the ordered item is no longer available, the corresponding amount remains as a credit record in the account (or is even retransmitted).

This procedure obviously is very time-consuming with immediate effects on information provision to the research system. The total delay in book delivery (in part due to slow response in book selection) is shown in the following diagram. The

integrated age distribution of books in Medicine, Engineering and Natural Sciences recorded in one issue of the SLSTIC quarterly union acquisition list "Current Science Bulletin" has been plotted. It is observed that the 50% level is reached at some 2.4, 2.8 and 3.8 years respectively for the areas mentioned, (meaning that half the titles are older than the ages quoted when catalogued and made available in the library. Since the "half-life" of many advanced texts is S&T is often no more than 5 years, the obsolescence of arriving material is striking and a cause for worry.

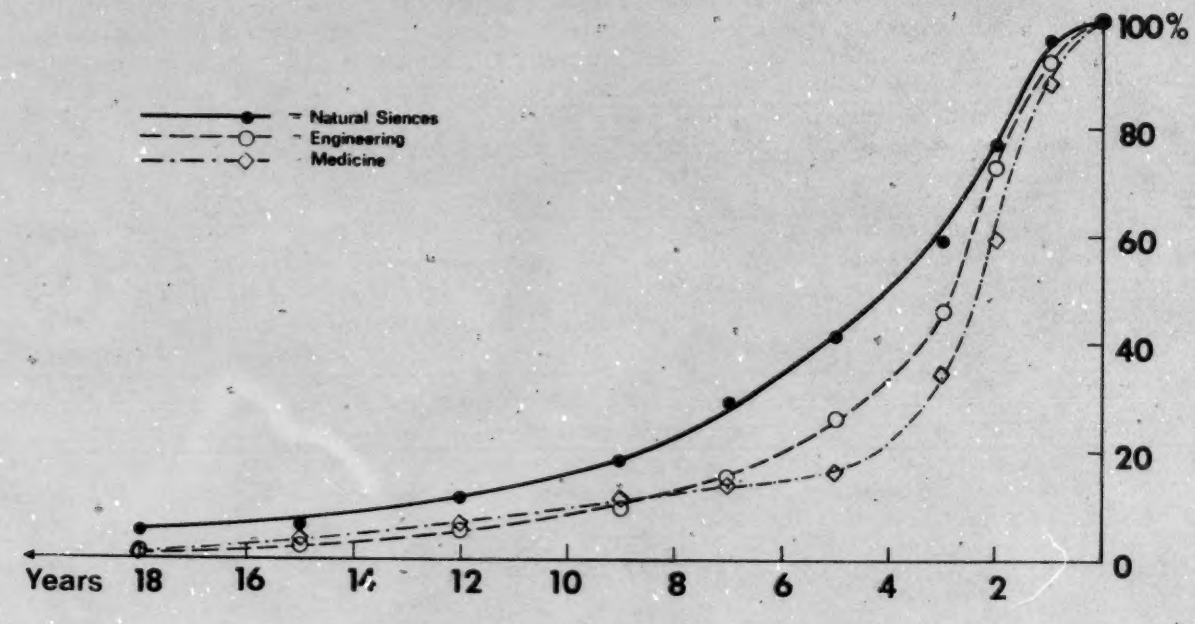


Fig. 3 Integrated age distribution of S&T books received by Sri Lanka research libraries

The current procedures not only give rise to considerable delays in delivery of books and in response to journal subscriptions, but also to economic inefficiency. The literature production and dissemination system (publishers, bookshops, periodicals agents etc.) is extremely complex with numerous agreement, conventions and restrictions. By taking advantage of a set of special features it is possible to make very considerable savings. For example it is generally better to order literature from the country where it is published, i.e. U.S., British, Dutch and German materials from suppliers in these countries respectively (the saving is usually at least of the order of 25%). There is generally a better response from publishers to large orders, (a lion's share of the delays being with the publisher). Certain special conditions can be negotiated and used systematically, as can also memberships in learned societies. Sometimes shipping charges can be reduced; in certain large-scale delivery schemes transportation is free.

There are of course means of taking advantage of these and other features and also of simplifying ordering procedures and thereby reducing the delivery delays. This requires a flexible and dynamic system of co-ordination in order to obtain economies of scale, and certain arrangements for administration and accounting to simplify ordering procedures and to make an adequate geographical distribution of orders possible. At present pre-payment into foreign accounts (exemplified by the SLSTIC

account with NTIS (US National Technical Information Service)) has to pass the Ministry (Industry, Higher Education etc.) and the Exchange Controller (Central Bank), with statements and renewals. In fact, however, each customer has already a "shadow"-account with his bookshop, to which payments and returns are credited, and deliveries charged. In the chapter on "Function for SLSTIC" (Ch. 2) a scheme for a clearing-house activity is outlined which should solve these problems without conflicting with currency and accounting regulations. The distributive accounting for this scheme, the ordering and reminder processes, the entire periodicals control system, and even a joint project for hunting back issues to fill gaps, could be operated within the development project for I&D services to be provided by SLSTIC. Much of this work could initially be performed manually or with simple electronic equipment, like an intelligent terminal in conjunction with an existing computer installation of sufficient capacity. In the long run use of a minicomputer could be foreseen, although at present this cannot be recommended as a realistic solution (cf. 7.2.5).

6. RESEARCH LIBRARIES II: BIBLIOGRAPHIC ACTIVITIES AND DOCUMENTATION SERVICES

Documentation services, from bibliographic searches to information analysis and critical evaluation, all originate from the analytical aspects of librarianship. However, the new forms of services require new skills and, in a sense, new attitudes to the role of libraries in the research system, an upgrading to a kind of participation in the research process. As long as the activities are pursued within the traditional library framework, with traditional formation and mainly humanistic background, there will necessarily be an emphasis on bibliographic work with different "outputs" or "catalogue products". Apart from card catalogues, there are "indexing bulletins", "current awareness bulletins", compilations within specific areas, directories, etc. In addition, if incentives and opportunities are provided, there may be offers of manual bibliographic searches (using abstracting and indexing journals and other reference sources - an activity which the researcher himself would normally be performing). The library can also act as an intermediary for contacts to obtain information services offered by other institutions (indigenous or foreign).

In a small system with small resources and a location distant from the "centre of events" - where Sri Lanka offers a good example - the user will in the first place depend on the local library resources. Any amount of ingenuity and labour on the part of local library services cannot make up for the basic shortage of literature, unless conceptually quite new services are designed and implemented, where external sources can be drawn on systematically. Such a design will have to extend the local resources by a combination of literature searches and literature supply so as to (as it were) emulate a large library and documentation system as perceived by the user.

This is what constitutes the central outcome of the present investigation (cf. Ch. 2), and to see exactly what is needed (and feasible) we have first looked at the research system and will here look at the bibliographic and documentation services offered.

6. Bibliographic activities

National Library Services Board (see Appendix III) is responsible for publishing the National Bibliography of Sri Lanka. It comes in monthly issues (lagging behind about one year at present - a gap for the year 1974 will have to be filled later). The printing process causes considerable delay, and the possibility of offset-printing is considered.

The highly acclaimed annotated Bibliography of Ceylon (ref. 22) is a continuing one-man effort by Dr. H.A.I. Goonetileke, director of libraries at Peradeniya University. This is "a systematic guide to the literature on the land, people, history and culture published in Western languages from the sixteenth century to the present day". To date vols I-III have been published.

The National Museum publishes the Sri Lanka Periodicals Index, presenting in a semi-annual bulletin bibliographic data on articles published in Sri Lanka journals, classified in the UDC system. The library also files the corresponding cards in its general catalogue, which therefore can be used as a cumulative index.

As was outlined in section (5.3.8), SLSTIC publishes (since 1977) the Sri Lanka Science Index, a quarterly bulletin presenting reports, articles and other publications on S&T in Sri Lanka. The Index is arranged in broad categories according to the UDC system. An analytic card catalogue is maintained at SLSTIC, and also an alphabetic catalogue for the reports, which are filed in the Sri Lanka Reports Depository.

There are of course a number of on-going specialized bibliographic activities which cannot be enumerated here, but a few indicative examples might be mentioned. The National Libraries Services Board has published "A Catalogue of postgraduate theses available in the university and research libraries of Sri Lanka", listing 400 items (ref. 21). The Coconut Research Institute (cf. 6.3.6) publishes a "Bibliographic Series on Coconut" (a volume covering the period 1971-74 lists 604 items) and also elaborates a thesaurus for the coconut area. A single effort is the compilation of a "Bibliography of Scientific Publications Relating to Sri Lanka 1960-74" (ref. 20), listing 2335 items. The forthcoming material will be included as a subset of the SLSTIC card catalogue associated with the "Science Index".

6.2 Union catalogues and directories

6.2.1 Union catalogue of foreign books in S&T

SLSTIC has taken the initiative (in 1977) to create a union catalogue of foreign S&T books in major research libraries in Sri Lanka. At present (1979) 23 libraries participate in this program (which was suggested already in 1968 (ref. 5)), including the university libraries at Colombo, Jaffna, Moratuwa (Katubedde), and Peradeniya, CISIR, CRI, IDB,RRI and Sri Lanka Medical Library. Libraries send catalogue cards (as a rule manually retyped) to SLSTIC, where they are filed in an alphabetic union catalogue. In parallel (since 1977) the quarterly "Current Science Bulletin" is published and distributed by SLSTIC to research libraries. The bulletin presents the recent additions to the union catalogue, here arranged under broad subject headings with subdivisions roughly following the UDC system. (Sri Lanka libraries usually adhere to the UDC or DDC ideologies.) The quarterly issues at present contain some 1200 items. A list of "Overseas Standards" received in the period covered by the issue is included as an appendix. The bulletin is typewritten and stenciled in 200 copies, with about 130 pages per issue.

The union catalogue and the bulletin solve the problem of catalogue information as efficiently as is possible with "conventional" means. There are however several drawbacks that hamper the extensive use of these instruments. While the bulletin is a "current-awareness" service, the catalogue would be consulted both to avoid duplication in acquisitions and to locate a requested volume for a possible inter-library loan. Since the union catalogue is located at SLSTIC, other users than NSC-staff either have to go there, telephone (which is not always so easy) or even write for information. Further, since no analytic catalogue is available, an important instrument for literature retrieval is missing. The bulletin, on the other hand, is subject ordered, but not cumulative, which makes it impracticable for a retrospective search. These factors might be eliminated if the input to the bulletin would instead be made in computer-readable form, the file updated and catalogues produced as COM-microfiche, the last part of the operation being done (to begin with) in co-operation with a centre abroad (cf. Ch. 2).

Although the participating libraries spend a considerable amount of work in keeping the Union Catalogue up-to-date, it is not extensively used as an instrument for locating literature in the inter-library network (at present only some 4-5 calls per week). The difficulties mentioned, in combination with the relatively low expecta-

tions of a positive search result ("hit") for a specific requested item in a collection that is small, slowly growing and therefore covering only a minor part of the published literature, suffice to account for this low usage. But there is another aspect to be considered in planning for an improved system for information provision, a problem revealed by looking at the level of service-mindedness within the library profession. The idea of "information retrieval" implies an attitude of responsibility for satisfactory response to user needs "against all odds", the conscious employment of all available resources for search and document delivery - not much akin to the classical guardianship of a library collection. A low utilization of available instruments (catalogues as well as abstract journals and documentation services) may be a symptom of a low service-mindedness in libraries. A new system of information provision therefore involves not only new channels of access. In order to have these used to advantage there is a need for a new way of thinking on the part of both users and intermediaries, which has to evolve through a concerted effort in re-education and attuning into new attitudes towards searching, providing and using literature (cf. 2.4).

6.2.2 Union catalogue of foreign periodicals in S&T

A union list of periodicals is an indispensable instrument for locating requested journal literature in a library network. In Sri Lanka a first effort was made by M.U.S. Sultanbawa (later to become the most prolific scientist in the country) in 1953, by compiling a "List of Periodicals in the Libraries of Ceylon". Subsequently, the Sri Lanka Association for the Advancement of Science undertook a new compilation, the "Union List of Scientific Periodicals in Ceylon" (1971), edited by M.A.P. Senadhira. It covered 48 libraries and listed 4000 titles, also indicating whether a set was current, incomplete or discontinued. In 1975 the National Science Council published a new list, to which information was contributed by 59 libraries, and listing about 3100 titles. The NSC publication "Directory of Current Foreign Science Serials in Sri Lanka Libraries" (ref. 12, 1975) indicates where the journal is available, but not the exact holdings.

In 1972-73 there was a practically complete cutback of funds for library acquisitions (cf. 5.2), resulting in serious gaps in most of the important journals that were subscribed to on a purchase basis. Later, in 1977, the devaluation of the Sri Lanka currency, in most libraries not compensated by a corresponding increase of allowances for foreign acquisitions) had the catastrophic effect that about half the foreign subscriptions had to be discontinued.

At present, a comprehensive union catalogue of S&T periodicals in Sri Lanka libraries is being compiled, in which information from 65 research libraries has been assembled, in several cases by personal visits of SLSTIC staff to search catalogues of periodicals. The total number of titles included amounts to about 8000, but of these only some 3000 are current. Further, probably some 30% or 1000 current titles are obtained by exchange or as gifts; which means, realistically speaking, that a good part of these (although interesting in their own right) are not high-priority items that would have been selected if there had been funds and a free choice. The residual 5000 titles, although many are important, were discontinued some time back. Even the current sets are in many cases incomplete, e.g. due to the financial crisis mentioned, but also due to the manifest lack of binding capacity, inevitably resulting in the loss of many journal issues (cf. 7.3.4).

A look at the list of libraries table 2 (5.1), and the presentation of research institutions (Appendix III) shows that most collections are fairly young, and one may assume that the oldest parts (corresponding to the beginnings of research activities) are fairly small. In any case, the holdings of periodicals are generally limited backwards in time by the age of the library (except for donations and take-overs).

A forceful programme for filling gaps, bringing the most important discontinued titles up-to-date and completing certain series backwards in time seems to be a commendable component of a functional library joint policy. A centralized effort entrusted to SLSTIC, where the centre could systematically build up contacts and watch out for opportunities will certainly give good results (cf. 2.2.1).

One interesting feature of the comprehensive union catalogue is that it shows the multiplicity of holdings for each title. This information gives a basis for discussion within research institutions and between libraries on efficient use of resources. A library's need for its own copy of a journal (if available in another library) can be compared to the advantage of an alternative high-priority title that is not available in the country. Such arguments naturally have to take into account the efficiency of the inter-library loan system, in particular the possibility of a rapid photocopy-cum-mailing service with a minimum of accounting administration (cf. 2.2.4).

The catalogue is at present only available in card form at SLSTIC, which makes it difficult to use for many purposes (loans, acquisition policies and gap-filling efforts). Retyping of the material on stencils or for offset printing is of course possible although time-consuming (some 400 pages). This will have to be done initially. However, the catalogue will have to be brought up-to-date relatively frequently, since a large number of changes are bound to occur (partly brought about by its own existence). The obvious solution to the updating problem is computerization. This is, as a matter of fact, a very simple application of well-known techniques. Each library would receive a printout of its own holdings as represented in the latest issue of the union catalogue, enter its amendments and return the list to the Centre. After updating, a new issue could easily be produced, either by offset printing from a computer-controlled "manuscript" or on microfiche (cf. 2.1.2).

6.2.3 Co-operative programme for abstracting and indexing journals

SLSTIC has taken the initiative to create a committee for distribution of responsibilities concerning important journals, and in particular abstracting and indexing journals. The objective is to ensure a better coverage of important reference material in the library network. The SLSTIC publication "Union List of Abstracting and Indexing Services in Sri Lanka" (ref. 15) presents a sub-file (192 titles) of the catalogue of foreign periodicals. Some of the titles are extremely expensive (1979: US$ 3800/yr for Chemical Abstracts; US$ 1150/yr for Engineering Index; US$ 3500/yr for Science Citation Index; US$ 4300/yr for Index Medicus). Yet these publications are used extensively in the day-to-day research work, and, for several applications-oriented areas, also in professional work. In a small system they represent the only information, a surrogate for the full text, on results published in the bulk of journals not available in the country (but available to scientists in developed systems even long before the appearance in abstract journals!). The argument that one subscription in the country is sufficient therefore does not apply (without reservations) to the most important and unfortunately most expensive abstract journals, even if it is reasonable for many "ordinary" journal titles.

The distribution of some important A&I journals is indicative of the problem, if the geographical location (see map of Sri Lanka, 5.1 fig. 2) and the transportation available are taken into account.

Title	Library	Holdings	
Agrindex	CARI	1975 +	
Beilstein	Peradeniya(chem.)		
Biological Abstracts	TRI	1927 +	
	Peradeniya U.	1966 +	
	SLSTIC	1978 +?	
CBA Abstracts	CARI		only complete set of 21 series
Chem. Abstracts	Peradeniya (chem.)	1907 +	
	CISIR	1920 +	
Current Contents			
Agr., Food etc.	TRI		
Chemistry	Colombo U.		
Engineering	Moratuwa		
Life Sc.	Colombo U.		
Engineering index	CISIR	1960 +	
	Peradeniya (engin.)	1969 +	
Excerpta Medica	SLSTIC	1978 + ?	39 series
Gmelin	Peradeniya (chem.)		
Index Medicus	Colombo (med.)	1960 +	
	Peradeniya (med.)	1967 +	
	SL Med. Lib.	1927 +	
Metals abstracts	Peradeniya (engin.)	1968 +	
Sci.Cit.Index	SLSTIC	1978 +?	

Table 3: Distribution of some important A&I journals (questionable continuation marked "?")

From a closer study of the list (ref. 15) it will be observed that many subscriptions are discontinued and quite a few important titles have been entirely dropped or have never been available in Sri Lanka.

The problem of scarcity of these resources would certainly be greatly alleviated by the introduction of individual-oriented computerized I&D services. As will be argued in the sequel it will be necessary to introduce some kind of external retrieval and document provision system in order to overcome what is here termed the "small system syndrome", and a programme for practical solution is suggested in the chapter on "Functions for SLSTIC" (cf. 2.3).

6.3 Documentation services

6.3.1 Directories

A number of directories related to the S&T system of Sri Lanka have been compiled and published by the NSC and SLSTIC. A common problem that besets these compilations is to get reliable and comprehensive replies from informants. There is perhaps a certain lack of experience in designing questionnaires, and formulating clear-cut questions avoiding ambiguities. Also, it is not easy to decide what information is helpful in a directory and what is superfluous, the answer depending on the particular use envisaged.

The problem of collecting adequate, consistent and reliable library statistics, to be used in management and for policy-making, is manifest in most library systems (cf. section 5.1). The Unesco/IFLA standards (ISO 2789 (1974)) are certainly helpful although not without flaws and difficulties of interpretation, and not including the very important financial data. They should in any case be extended to describe special characteristics of importance, and matters of economy.

The directories of concern here are

a) "Directory of scientific and technical libraries in Sri Lanka" (1977, ref. 16), listing 55 library units.
b) "Scientific and technical institutions in Sri Lanka" (1977, ref. 17) listing 87 units.
c) "Directory of scientific research projects in Sri Lanka" 1970-73 (1976, ref. 19). The difficulties in defining a "project" make it hard to estimate a number of projects, but about 600 researchers were directly involved. (An earlier directory of research projects was published by CISIR in 1970).
d) "Directory of scientific and technical personnel of Sri Lanka" (1974, ref. 18) listing about 1200 individuals.
e) "Sri Lanka scientific and technical periodicals directory" (1979, ref. 14) listing 51 titles. An earlier issue (1976, ref. 13) lists 58 titles, the downgoing trend being characteristic of the present situation (cf. 7.1.1). It should be mentioned here that the National Museum has published a "Ceylon Periodicals Directory" (1971) with a supplement (1976).

Some of these publications, for example the directories of S&T institutions and of S&T libraries, do not need frequent updating (and in fact serve mostly as guides for the novice). On the other hand the directories of S&T personnel and of ongoing R&D projects obviously have to be updated very frequently to be of any use. At present a major survey of S&T personnel is carried out at the NSC, the data being processed by computer. The basic file can readily be updated as new information becomes available. For research projects it is equally feasible, albeit somewhat more complex, to maintain an up-to-date file. Similarly it will be feasible to computerize the system of research grants and associated management processes.

These examples are here taken up mainly to show that the idea of acquiring a mini-computer for handling the files to be managed by SLSTIC and to perform operations related to documentation services can easily be shared for purposes very central to the operations of the National Science Council.

6.3.2 Current awareness services, retrospective searches and reviews

A simple service of the "current awareness" kind is the acquisition catalogue. The immediate examples that come to mind are the "Current Science Bulletin" (presenting new entries in the union catalogue of foreign books) and the "Sri Lanka Science Index" (presenting recent reports and journal articles in S&T), cf. sections (6.2.1) and (5.3.7). The acquisition list from the British Council (S&T part) and the SLSTIC bulletin "Current Environmental Acquisitions" both represent subsets of the "Current Science Bulletin". A service that would be interesting in principle is the SLSTIC bulletin "Current Contents in Environment", which however is limited only to journals available to SLSTIC.

The CISIR maintains, as a UDC-classified card catalogue, an "Information Index". Entries are made for all material that is regarded to be of potential interest to science and industry in Sri Lanka. (Even though the concept of "science" excludes agriculture and medicine (cf. 4.1) it would seem to be a rather vast undertaking.) Periodicals and abstract journals are scanned, reprints or copies from abroad are requested where necessary. The catalogue records are also brought out in the quarterly bulletin "Current Technical Literature" (about 3400 items in 1977). Further,

a personal service for queries and manual literature searches is provided for CISIR staff (ref. 26). A series of state-of the-art reports (reviews) is published in areas of particular interest to industry (mainly on industrial use of local crops), work being performed on NSC grants.

In the same category comes the monumental review of tea research recently published by the director of TRI (R.L. Wickremasinghe: Tea, Advances in Food Research 24(1978)).

The IDB has an information programme similar to that of CISIR, with a monthly "Current Awareness Service" in the form of an indexing bulletin for the area of industrial applications. IDB also publishes a quarterly "Products Bulletin". In addition there is service for individual queries and manual literature searches.

Manual searches are provided also by the Sri Lanka Medical Library. No information was available on the volume, but judging from the total staff of 5 it must be relatively limited. This should be related to the fact that Medline searches, albeit free, are not really used (6.3.4) and that searches on the Lockheed data base of Excerpta Medica are not presently available in Sri Lanka.

A "genuine" current awareness service should of course cover as large a part of the current world literature as possible and be tailored to individual profiles of interest. Some of the "manual" services are individual-oriented in this way. The comprehensiveness is however limited unless the international data bases can be searched regularly. Although much of the material in the data bases is eventually available in the printed A&I journals, in an important sense the computer cannot be substituted by "manual" search techniques, mainly for reasons of timeliness, (the single copy comes late and will be occupied by one search at a time, and furthermore it is doubtful whether a complex search logic can be handled manually).

There is an important qualification to be made to the last statement. Since much S&T information pertinent to countries in the Tropical Zone (and in the developing areas in general) is not entered into the large data bases there will be lacunae in outputs from computer retrievals. The local efforts, like the indexing services of CISIR and IDB are therefore not replaceable by computerized SDI services. They could however profit greatly from a couple of standard profiles to cover the bulk of" standard sources" of S&T literature in their areas of interest, and concentrate their own efforts on the supplementary material that is not computer retrievable. The same goes for institutes like RRI, which was amply demonstrated by retrospective searches on three areas specified by RRI research staff. (The searches were carried out by the Information and Documentation Center (IDC) of the Royal Institute of Technology Library, Stockholm, in February 1979.) Another way, discussed in the "Health Research Information" area is to generate a special data base by concerted effort from those concerned (cf. 6.3.4).

The design of a system for provision of S&T information, including as an essential component external search services and document delivery, is one of the central ideas in the programme suggested for development of SLSTIC (2.3).

6.3.3 Extension services

In developing countries the system of extension services to agriculture and small idnustry is of major importance for advancement of productivity. It consists of a combination of information provision and training programmes, for its organization and implementation mainly dependent on a hierarchy of extension officers, transferring knowledge and experience from applied research and development work to the practitioner. Therefore I&D services (should) play a certain role in supplying material to be digested, reviewed and synthesized into a form that can be used in the extension programmes. This is what is done by the IDB information service with respect to the IDB extension activities, and also what should be done by the libraries of ARTI, CRI, RRI, TRI and CARI (although resources may at present be lacking).

The problem is of course that the S&T literature needs "digesting" in order to come within reach of the ordinary practitioner. A number of journals are produced to transcend this gap, e.g. the "Bulletin fo the Rubber Research Institute" and the IDB journal "Karmantha" (=industry). The journal "Vidurava" (=research) published by the NSC is not really "popular", but presents general information on selected topics to the research community and to administrators. There is certainly a need for a larger output of "extension literature", in the form of a kind of "popular science" but directed to immediate practical use. In section 7.1.1 and in the chapter on "Functions for SLSTIC" (2.2.2) some ideas in this direction are indicated.

A central problem in the present context concerns how to keep extension officers and extensional training programmes up-to-date with technical developments that are ready for practical applications. Such recurrent education must be based on some kind of development policy and take into account the subtleties of socio-technologic feasibility and desirability. The library and information service undeniably has an essential role to play in search and provision of adequate literature. But it is important to make clear that the actual selection and reorganization of the material and its transfer to the level of extension services is not the responsibility of library and information services. This position is a direct consequence of the definition of objectives formulated in Ch. 3.

6.3.4 External documentation services

Although any kind of searches on the large systems, like Lockheed, SDC etc., would be technically possible, the cost for the research community in Sri Lanka would be prohibitive. The establishment of certain services via Australia has been mentioned as a possibility. There are, however, cases where services have been funded externally. WHO has offered free Medline searches to be performed in Geneva, with some back-up for document delivery from the WHO library (which has 3000 current journals but seems to be understaffed). The Medline queries are submitted by medical libraries in Sri Lanka to the regional WHO office in New Delhi and sent on to headquarters. The utilization of this service has been rather low. There may be several contributing reasons: insufficient promotion efforts; difficulties with the indirect searching procedure and the subsequent need of feedback; too small system of active research; low level of literature-mindedness, related to specific conditions of higher education. A serious effort of evaluation would give answers that could be useful for an activation of the community to the use of services offered. In the plan for development of SLSTIC (2.5) a division is envisaged for "statistics, evaluation and research", and a study of the kind indicated would obviously fall within its duties.

The Subcommittee on Information within the WHO Advisory Committee on Medical Research has recently (Sept.-78) discussed a programme for information services to developing countries. A number of interesting projects are discussed, like publishing a "Quarterly Bulletin of Tropical Diseases" (extracted from Medline), building up a "Health Related Information System" (HERIS, focussed on the situation in developing countries and supplementing Medline and Biosis) and a document delivery service of photocopies to developing countries.

The IDB is national focal point for the IDRC-sponsored Asian Network for Industrial Technology Information and Extension (TECHNONET), with headquarters in Singapore and participating organizations in Bangla Desh, Hong Kong, Indonesia, Korea, Malyasia, Philippines, Singapore, Sri Lanka and Thailand. The organization supplies a large number of reports on microfiche (which so far have found relatively little use in Sri Lanka) and a computerized SDI-service (standard profiles) on their own database. It also offers training programmes for information officers and extension officers.

The input to international information systems should perhaps be a matter of concern. The Department of Agriculture (Peradeniya) is responsible for AGRIS-inputs,

and the Ministry of Planning is responsible for UNEP-referrals (UN Environmental Programme, Nairobi). Since most applied areas are multi-disciplinary, it is more than likely that an information centre with a wide spectrum of contacts and functions might contribute to a more comprehensive overview of the information and personnel concerned with the areas to be covered. It might be possible, for example, while retaining the overall responsibility of the Department of Agriculture and Ministry of Planning, to transfer the operational duties to SLSTIC where, as a side-effect of the work on Science Index and on the data files of S&T personnel and projects, the information would be available anyway, even in an easily identifiable and retrievable way. The same argument could be advanced to make e.g. the Ministry of Health responsible for the eventual input to HERIS, while SLSTIC could have the operational duties. This procedure would evidently profit from the availability of a mini-computer (or an intelligent terminal), whereby even a regional responsibility for collecting and preparing inputs in computer-readable form to a world-wide system could be accepted (cf. 2.2.3 and 7.4).

6.3.5 Contacts with other centres in the region

In spite of Unisist meetings and declarations (Dacca 1977), meetings of I&D centers in the region and bi-lateral agreements on co-operation in S&T, there is surprisingly little factual exchange with Sri Lanka libraries and information services. There is obviously a great potential for sharing of resources once photocopying becomes possible at low cost, and preferably (to some extent at least) on a clearing basis between centres. The SLSTIC reports depository (5.3.8) should provide an interesting asset for exchange, although the situation will always be uneven with respect to the large S&T libraries in India, for example. Anyway, with regard to manpower and air-mail costs the supply of photocopies from India should be much more advantageous than supply from libraries in Europe or the US. SLSTIC could easily serve as a national focal point for these transactions. Both the computerized searches and the document delivery service suggested in the program for "Functions for SLSTIC" (see 2.3), must in the long run be handed over to services on a regional level (or to a construction like the "World Centre for Transfer of S&T Information for Development, as suggested in ref. 9 (cf. also Ch. 9).

There are some well-functioning sectorial working-contacts. A good example is the co-operation between RRI of Sri Lanka and the Malaya RRI. Further, there are exchange agreements for literature dissemination in coconut research and tea research (cf. reservations made in 4.3), whereby a reasonable coverage of these relatively restricted areas is achieved. There are lacunae, however, e.g. in contacts with the African countries in the tropical zone. It seems possible that the WHO initiative in health related research information (6.3.4) could find counterparts in other areas, like agriculture and industrial development. In this process SLSTIC could play an important role by practical work on inputs to co-operative ventures, and by taking up and maintaining a network of informal contacts in order to fill the general agreements with practical content (2.2.3).

6.3.6 New I&D centres

In many sectors of economic importance to countries in the tropical zone, the international I&D systems are not of much help (cf. 6.3.2). This is the reason for the on-going discussion concerning, for example, the health related information. Still more region-bound are the main crops of Sri Lanka, Coconut, Rubber and Tea. While the area of tea production seems to be highly competitive (cf. 4.3) and rubber has already a strong centre in the Malaya institute, there may be a need for a concerted effort on I&D services on agricultural and industrial aspects of e.g. coconut. The IDRC has recently (Oct.-78) approved of a project for a regional Coconut Information Centre to be housed by the CRI of Sri Lanka, granting about Can. $ 200.000 for the period 1979-81. The objectives will be to:

a) collect literature on coconut cultivation, processing and economy;
b) establish and maintain an information storage and retrieval system;
c) provide photocopying service;
d) provide bibliographic and abstracting service;
e) provide question answering service;
f) produce and distribute a newsletter on on-going research;
g) maintain and publish a directory of expertise.

A project proposal from ARTI to the US AID (Agency for International Development) for building up an I&D centre related to sociology and management in agriculture and agrarian society is presently considered. The same order of magnitude has been mentioned, US$ 200.000.

6.4 The need for continual evaluation

The general appeal of S&T information provision seems to be related to the belief that a great impact might result from relatively modest efforts. This expectation would be as naive as believing that transfer of technology proceeds simply by shipping some pieces of equipment (cf. Ch. 9). There is rather a kind of metabolism that controls which kind of inputs and how much of them a social organism is prepared to assimilate to its advantage, and an evolution of the entire organism may be needed to change this balance. In the conception of functions for SLSTIC there has been a consistent emphasis on the need of a wide spectrum of parallel activities, some of which are neither straightforward operationally, nor easy for the community of users to understand. In particular there is a need for training of the users to make them participate actively in solving their own I&D problems, and thereby discovering the utility of new options. If this and a multitude of other interlinked components of a development policy for I&D services are not followed up consistently, there is a clear danger for any centre (irrespective of its conceptual foundations) to end up as an enlarged (semi)-conventional library far off on a branch of diminishing returns.

A general reflection is therefore that such relatively big investments as the centres mentioned in the last section should be co-ordinated with the Unesco project for SLSTIC in order to make the best use of resources in the form of equipment, external service agreements and external support in development of training programmes (and possibly computer applications). Many of the problems facing I&D services in different areas are identical or very similar, and there is manifestly a lack of personnel with experience of modern documentation techniques. This is a fortiori the case in a country like Sri Lanka where the user-community, due to the predicament of the educational system, must be expected to be less responsive to new services and less literature-minded than corresponding communities in the developed countries, apart from a very small elite with experience from higher education in the U.K. or elsewhere. This adds a further difficult problem that requires particular concern and studies.

The more general need for evaluation of I&D services should also be considered (cf. Ch. 3). It is relatively easy to design a number of activities (mainly "conventional" or "semi-conventional" bibliographic services of the kind described in the beginning of this chapter) which, once set on their track, continue moving on (as it were) by their own inertia. However, it is very difficult to assess the usefulness of these services, and in particular the relative merits of alternative information services. Studies of a number of different factors that contribute to user behaviour, and the effects of different services on research performance have to be carried out. This also goes for the factors that play a significant role for the efficiency of educational programmes. A continual effort has to be spent on follow-up studies to ensure that programmes are on the right track and, if necessary, to redirect those services that do not prove to be effective.

Studies of the kind here indicated and forming part of what might be called "Library and Information Science" are included in the suggestions on "Activities for SLSTIC" (2.5).

7. LIBRARY-RELATED ACTIVITIES

7.1 Publishing

Publishing (the "formal" way of documenting and disseminating S&T results) and personal contacts (the "informal" way of communicating) normally supplement each other in large, highly developed systems. The prerequisite is frequent opportunities for contacts (direct or by telephone), and a reasonably fast publishing system for different kinds of documents (reports, journal articles and monographs). In a small system, with scarce resources and the additional difficulty of isolation by distance to the "centres of events", the publishing aspect assumes a dominant part if at all one wants to partake in the international S&T developments and maintain contacts for direct communication.

7.1.1 Journals

A considerable part of the research output in Sri Lanka is not published in the country. It is natural for scientists to take advantage of the large circulation and prestige of international journals to attain visibility for their work. As a consequence, particularly in countries with a small research system, local research journals have difficulties in attracting good manuscripts, and they tend to be used either for rapid publication (if this is the case) or to bring out material that is not fit for the international journals due to its subject matter, form or quality. Exceptions are areas where local research is internationally important, areas of strictly local interest, and journals which, by a strict editorial policy, attain an international "standard of excellence". (These should be taken as coarse overall statements. Even conscientious editing and screening does not always guarantee a purposeful selection practice.)

All the cases suggested are present in the S&T journal production of Sri Lanka, where the journals of the RRI, the Marga institute and the NSC could exemplify the different categories of exceptions. However, the widespread small-system problem of fragmentation is clearly discernable, and there also emerge indications on how to deal with the problem.

Some data can be drawn from the "Sri Lanka S&T Periodicals Directory" (1979, ref. 14; and 1976, ref. 13). In the three-year period between the issues, eight journals seem to have ceased publication. (This is in fact difficult to assess since a number of titles are issued so irregularly that it remains an open question for years - even to the publisher? - whether or not a journal still exists.) Of the 51 remaining titles, 39 are in English and 12 in Sinhala. Some of the English titles are simultaneously published in Sinhala (e.g. Karmantha (= industry) published by IDB, and the Bulletin of RRI) or in both Sinhala and Tamil (e.g. Vidurava (= scienc), published by NSC). Of the 39 English titles 7 have not been issued since 1975 and another 7 not since 1976, most of them "semi-annual" or "quarterly". Only about 20 of the English titles can be regarded as research journals in the strict sense. Circulation is normally in the range 200-600, an exception is the "Proceedings of SLAAS" with an edition of 1200 (for members). The remaining ones are addressed to wider circles, either professional (extension service, news bulletins, socio-political discussions etc.) or popular (leisure-activities oriented), with a much wider circulation (1500-7500). Many of the research journals are edited under difficult working conditions, as hobby-horses of some scientist without much secretarial help.

Some of the research journals have a quite long tradition, for example the "Annals of the Royal Botanic Gardens", Peradeniya (started in 1901), later merged into what was aimed to become the "Ceylon Journal of Science" (1924), with ten

different sections covering all areas of research. Only few of these ever took off. In 1949 the medical section made itself independent, and in 1957 the surviving three sections merged into the "Ceylon Journal of Science: Biological Sciences".

The fragmentation of efforts can be illustrated by the situation in Health Sciences:

Journal title	issues/year (nominally)	circulation
Ceylon Dental Journal	1	?
Ceylon J. of Child Health	1	200
Ceylon J. of Medical Sciences	2	400
Jaffna Medical Journal	1	600
J. of the Ceylon Coll. of Physicians	1	200
Sri Lanka J. of Surgery	1	?

Table 4: Sri Lanka Journals in the Health Area

It seems likely that the material would be sufficient for a quarterly journal of medical sciences for international dissemination, and possibly a local bulletin produced in a simpler fashion. Several other areas seem to follow a similar pattern which would give room for upgrading.

A process of upgrading of research journals with respect to quality of materials and reliability (speed) of production should contribute to make the local research part of the international research venture. It might also reassure the local research community of the standards of indigenous work. Further, the value for the exchange mode of journals acquisition is much higher than the cost of production in Sri Lanka of the materials used for exchange. Consistently used to maximum advantage, the high-quality Sri Lanka research journals might become an important asset in the acquisition "budget" (5.3.9). (The difference in cost of printing as compared to the industrialized countries is in fact so great that it would even be profitable to take up scientific printing as an export industry.)

What would be needed to attain this upgrading is an editorial secretariat with professional staff trained to do the editing (preparation of manuscripts for processing) and publishing (management, contacts with printers, distribution). The secretariat would work for different scientific editors, who would be responsible (with some editorial committee) for the selection of materials. The secretariat could also assist in maintaining contacts with referees (copying and sending manuscripts, reminding, feeding evaluations back to the scientific editor - and rejections to the author, etc.). With such an arrangement, which could be housed by the SLSTIC (where already an excellent editorial work is done on the "Journal of the NSC") it would be rational to decide, within the research communities and organizations concerned, on a merger of sets of journals into some three or four, with ambitions of high standards of excellence in selection, screening and printing.

The editorial secretariat could, as one of its duties, select news items and articles from the semi-popular science press (like New Scientist) and publish a bulletin of translations in Sinhala and Tamil as an effort to promulgate and develop the public interest in science and technology. The copyright agreements could probably be obtained with reference to the particular situation.

A further duty for the secretariat, conducting courses in report writing and scientific editing (in particular for offset printing) will be discussed in section (7.2).

Offset printing would normally be made from typescripts (possibly photographically reduced) written with a carbon ribbon. For texts in Sinhala and Tamil there are

modern typewriters, produced by Olivetti and Olympia. In March 1979, the Wang Computer Corporation will release a word processing facility for their computer model 2200VS, which is considered as a possibility for SLSTIC operations (cf. 7.2.5). This would render a beautiful solution to problems of catalogue production. Further, it is not inconceivable to produce a type wheel with Sinhala (or Tamil) characters (and to solve associated minor software problems for control of printout), with yet a number of interesting applications, such as the production and cumulation of the National Bibliography of Sri Lanka. It should be noted that text-processing facilities are available also for advanced "intelligent" terminals (cf. 2.2.5 and 7.4).

7.1.2 Bulletins, newsletters and annual reports

This material is mainly for local use. In the case of large circulation, like the non-research journals mentioned in 7.1.1., it is worth while to print in a none too elaborate fashion (like Karmantha and Bull. of the RRI). For restricted circulation it would seem to be expedient (both for cost and speed) to use offset printing from photographically reduced typescripts. A number of offset printers are available within the system (cf. Table 2, sect. 5.1). SLSTIC will have to acquire another machine with higher capacity, sufficient to take on smaller external jobs (2.2.4).

7.1.3 Dissertations

So far very few doctoral theses are presented in Sri Lanka universities (cf. ref. 21). The present trend to strengthen the S&T system should, however, result in more research work being done by postgraduate students. Also, like in many developed countries, there is an increasing amount of "extra-mural" work to be expected, if only the technical faculties are prepared to encourage and possibly supervise doctoral studies performed at research institutes. Due to the cost of publishing, dissertations are often produced only in few copies, not readily available to the research community, although they may present quite important work. The microfiche-technique has proved to be eminently useful for the purpose of disseminating dissertations. A master is produced with a special camera (98 frames, each corresponding to an original manuscript page, on a card in A6 format is one commonly used standard) but no stock is needed since copies can readily be made according to requests at a price of about 2Rs per card). This material can also be used for exchange purposes in acquisition of journals from foreign institutions. At ARTI a DOGMAR microfiche camera is available, and could be used for SLSTIC needs initially (2.2.4 and 7.3.3).

7.2 Education and training

The present programmes in education and training for librarianship and documentation services in Sri Lanka are described in Appendix VII. Undoubtedly, there will be need for programmes directly oriented towards modern I&D services, both manual and computerized. Such courses must be designed not only for information professionals (librarians and documentalists), but also for various categories of users (undergraduate and postgraduate students, research staff, educators, extension officers, engineers etc.). A considerable effort has also to be foreseen in promotion of library and documentation services and in fostering awareness of new options of information provision and a positive attitude to their use - in brief a new level of "literature-mindedness". The bi-lateral support programme, suggested for SLSTIC in the introductory phases of developing new I&D services in Sri Lanka (2.3) will include a strong effort in education and training (cf. experiences from the RITL projet in Portugal, refs. 27 and 28).

The proposed editorial secretariat within SLSTIC (7.1.1) might well have as one of its duties to conduct courses in S&T writing (reports and articles) and in editing

and layout of manuscripts. In particular when offset printing is used, it is important that authors are able to do their own editing and production of a "camera-ready" manuscript. These courses could also bring out the role of scientific writing in research, and the role of references for establishment of an international relationship in on-going research. Such courses could contribute, from a new angle, to a better literature-mindedness in the younger generation entering the field of active research.

For the purpose of all these educational programs, the literature in the "Sociology of Science" now collected by SLSTIC library will be useful. A further area should be added to the collection policy, namely "Library and Information Science".

7.3 Technical facilities available or marketed in Sri Lanka

7.3.1 Printing

The original plan for SLSTIC seems to have included a rather extensive printing activity, and a large part of the funds were reserved for equipment to this end (cf. ref. 6). It seems to the present investigator that a good case can be made for a quite different set of priorities, whereby the weight comes to lie on external I&D services and on external expertise to build up an indigenous know-how on I&D techniques (cf. Ch. 2). In this conception, the printing activities of SLSTIC would be reduced to an auxiliary function, operated on a couple of small offset printers. A real printing office (e.g. for high-quality journal production) is anyway out of the question, since this a quite different matter.

In effect it seems likely that the present difficulties in scientific printing are due not to a lack of printing capacity in Sri Lanka, but rather to a lack of organization of scientific editing and publishing (cf. 7.1.1). There are a number of qualified printers, like

H.W. Cave & Co., Ltd, Colombo
Swadeshi Printers Ltd, Colombo
Caxton Printing Works Ltd, Colombo
and Sri Lanka University Press, Katubedde,

the latter printing, inter alia, the excellently produced "Journal of the National Science Council of Sri Lanka".

As appears from Table 2 (T.1), a number of research institutions have their own offset equipment for production of bulletins, reports, administrative documents etc. Among the modern types available are the following, where approximate prices for 1978 are indicated:

Gestetner 211	US$	10,000
Ricoh Printer 1010		3,000
Ricoh Auto Printer 2600		7,300
Heidelberg GTO		30,000
Platemaker for Gestetner		2,000
Guillotine Cutter Polar-Mohr 72 (electric)		9,000
Guillotine Cutter Gestetner (manual)		2,600
Lithotex Vertical Camera 25		3,500
Varityper Composing Machine Headliner 820		4,000

(in a few cases prices were given for equivalent equipment instead of the models named)

The Katubedde press works mainly for the universities, but takes on some external jobs. It employs a staff of 103 persons, and is equipped with 8 printing machines and one small (Gestetner) offset printer. The machines are partly relatively old, some are hand-fed: Wharfedale (1950); Harrild & Sons; Little Giant (1950); Heidelberg Platin (1960); Titan (1971). A modern Heidelberg printer with high capacity has been half-promised by the university administration, possibly in anticipation of some foreign grant. It is certainly highly desirable that this additional equipment will really be installed.

Unfortunately the University Press was originally set up to print an incredible amount of (partly confidential) "examination papers" for the entire educational system, which occupies its capacity full-time for four months a year. The production of the "Journal of the NSC" shows emphatically that the University Press is capable of doing the job of scientific printing meeting the most advanced requirements. To solve the technical problems of high-quality journal production, it would seem advisable to divert some of the simpler and very time-consuming jobs to other printers, whereby security problems would have to be solved in one way or another.

7.3.2 Photocopying services

An activity of growing importance, also economically, for research libraries is the provision of photocopies, mainly of journal articles. In developed R&D systems this has brought about a fundamental change in reading habits and usage of literature. The convenience of having one's own copies of important articles and the high cost of manpower combine to make copying an alternative preferred to loans. Further, the journal issue or bound volume remains available in the library ready to be reused immediately. In the interlibrary "loan" system, copies have in many cases completely substituted "conventional" loans of research journals.

A development in this direction will be necessary if the programme of shared resources shall become effective, but as yet the evolution is only in an embryonic stage. Due to strict currency regulations up till 1977, very few copiers were available in the country, and practically none in the research libraries. These machines were all operated with coated paper, an inconvenient and expensive technique. Since 1977 there is a veritable boom for plainpaper copiers on the market in Sri Lanka.

Quite a few machines are now offered with assurance of excellent service (which must be made an absolute and verifiable requirement!): Cannon (5500), Xerox (3107, 660-1, 2202), Mita Copystar (MC-10, MC-20) and Nashua (1210, 1220S, 1240). Of these, Nashua was marketed first and very successfully. The reviewer had the occasion to test a 1220S (which was placed in an important institution and reported to have been recently serviced) with catastrophic results. The Canon seems to be of excellent construction but is too expensive at present (with respect to the expected volume of copying at each installation). The Xerox 3100 is a good machine for library use, while the Xerox models mentioned are not suitable for various reasons. The Mita machines have not been available for test. There is a technical difference between Nashua and Canon/Xerox/Mita in that the former uses "wet toner transfer" while the latter use "dry toner transfer". Nashua claims that this difference is important in a tropical climate, where the dry technique may give rise to disturbances due to clustering. Inquiries with the National Reprographic Centre for Documentation (NRCd) at Hatfield Polytechnic (UK) have not yet been answered (March-79).

The following table gives some technical and cost specifications for comparison. The time required for the "first copy" must be as low as possible for library use. It is unclear under what conditions the figures for durability of consumables are valid:

	Nashua * 1220S	Nashua * 1240	Mita Cop. * MC-20	Xerox ** 3100	Canon ** 5500
Price(US$	4,100	4,500	3,540	6,200	9,000
1st copy(sec)	4	4	5	8	7
speed(C/min)	20	28	20	20	26
drum(US$) (80.000 cop)	254	254	205		
dispersion & toner (US$) (80.000 cop.)	135	135	65	1,460	1,860
Service contract incl. spare parts (per year)	100	100	100		

* Offers from representatives in Sri Lanka
** Prices and service contracts in Sweden, calculated to correspond to an annual production of 80,000 copies

Table 5: Technical and cost specifications (Jan. 1979) for some plain paper photocopiers marketed (1979) in Sri Lanka (cost of paper to be added).

The technical specifications for MC-20 compare with 1220S, but the operational costs for the former are more advantageous. The prices for Xerox and Cannon relate to the Swedish market. It seems that the bigger machines have a much higher maintenance cost (per copy) than the smaller ones. However, experience of service in Sri Lanka is very limited and the offers for "service contracts including spare parts" may turn out to be unrealistic (in spite of the low cost of manpower). Further, the quality of copies may differ. It was not possible to pursue a conclusive test during the mission, but the wet-toner machines seem to yield a somewhat diffuse print.

The availability and price of white paper of reasonable quality seems at present to be a serious problem in Sri Lanka. Yet, presumably the production costs of a copy with the plain paper technique ought to come down to somewhere in the neighbourhood of 0.30 Rs (2 US cents) except for the depreciation of equipment.

Libraries now offer copying services according to their as yet limited capacity, at prices varying from about 0.75 Rs (local) to 0.25 US$ (foreign). The present accounting system, conceived for general purposes, turns out to be extremely cumbersome for the minute amounts to be paid cash or transferred. An invoice with four copies has to be written (standard formulas have not yet been designed) and each copy sent on, processed, filed, and processed again in the case of transfers. It is imperative to introduce a simplified form of accounting when the volume of photocopying and other services with small fees increases. Good experience is available from large systems, where pre-payment or post-payment is made to a customer account handled in a simple card file and operated by the photocopying department. Libraries normally can deal with "copies in lieu of loans" on a clearing basis, perhaps with some annual adjustments for cases of considerable unbalance of service volumes.

Since most libraries - even the large university libraries - do not have any adequate equipment, a programme for improvement of information provision, necessarily based on efficient resource sharing of library collections, must envisage deposit of good plain paper copiers at several important "nodes" in the library network. This is foreseen in the proposals for development of SLSTIC (2.2.4), whereby ownership has to be arranged so as not to cause any conflict with current

regulations on budgeting for foreign aid (cf. Appendix II). It may be noted that this programme will attain more or less exactly the objectives laid down in a project idea advanced by the Netherlands Alumni Association of Sri Lanka (in Jan.-78) to be considered by the Netherlands Literature Programme (cf. 4.3.1), but apparently shelved due to dwindling funds and possibly also in virtue of the general policy for the programme.

7.3.3 Microfiche techniques

At present, microfiche readers are rare in Sri Lanka. Yet the microfiche is a very convenient medium for reports, catalogues and other material that are consulted but not necessarily read en masse. The equipment is relatively cheap - a good reader with exchangeable optics for different magnification standards (like 3M Consultant 114) is available for about US$ 450, and a reader-printer for some US$ 2.500. The possibility to make so-called Diazo-copies of fiches at a cost of some 2 Rs per fiche should also be considered. A camera equipment for microfiche production (the Dutch "DOGMAR") is located at ARTI and apparently not used at present. The technique is interesting for reproduction of relatively extensive manuscripts with relatively low expected circulation, like doctoral theses (cf. 7.1.3), bulky reports, archival materials of various kinds, etc.

Microfiche versions of report material from abroad are frequently available at considerably lower rates than the "hardcopy" versions. This is the case for NTIS reports (publicized in the abstract journal "Government Reports Announcements") for which SLSTIC is a national focal point (cf. 5.3.10). IDB is currently receiving a large quantity of reports on microfiche through its membership in TECHNONET (5.3.10).

Concerning the present situation on the market for micrographic equipment products and services it is convenient to consult the 1978 Buyer's Guide from the National Micrographics Society (US). There are a number of storage problems to be considered to avoid deterioration of the fiches. The tropical climate with high temperatures and humidity is prone to provide an environment for fungal attacks on the film gelatine. A dust-free air-conditioned space seems to be commendable, and at least a cool storage space for the fiche collection. Problems of this kind are discussed in e.g. "Storage and preservation of microfilm" (Kodak Pamphlet No D-31, Kodak Co., Rochester) and "Film Preservation" by H. Dorfman (Microfilm Techniques 5(Nov. 1976)7).

7.3.4 Binding

As a rule libraries send their journals for binding to bookbinding firms or to the binding department of the University Press at Katubedde. Waiting times are very long (in the order of six months or more) due to low capacity, and most probably also inefficient organization. The technique is the classical "true" binding, which of course gives strong volumes and in principle is the only technique that satisfies very high demands of a esthetic quality. However, it is very time-consuming, and neither the materials used nor the workmanship (in general) would justify this method since satisfactory alternatives are available. As the cost of manpower is very low, the price of binding is cheap as compared to the cost of acquisition. It would therefore still be possible to maintain a reasonable efficiency and cost by operating with a very large staff of binders. This is not done.

The new technique of cuttung the back and glueing with a special fast-drying polymer resin (e.g. the Swedish Lumbeck-type product "Hernia") gives results that are extremely functional for the particular use in binding S&T journals. The volume is sufficiently strong for all practical purposes, the leaves do not tear off as is sometimes claimed by "classicists", and the volume opens completely (180°) at all places, which is ideal for photocopying. The equipment is very simple, mainly a cardboard cutter and a guillotine cutter which could be manual. It takes some time of apprenticeship to master the technique without failure. At least a factor of ten will be gained in efficiency.

7.4 Computers

For natural reasons Sri Lanka has been slow in entering the computer age. There is, however, reason to consider the present possibilities in computer precessing, since I&D services are to a large extent dependent on fast access and fast processing, where computers cannot be replaced even by skilled manpower. Further, to advance from the library-procedure-oriented "conventional" literature searches to automated retrieval in the international databases, inevitably external computerized services will have to be solicited. The management of such services requires insights in the structure of databases and in the processes of retrieval for which some experience of computer operations is almost indispensible.

The "small system syndrome" referred to on many occasions in this report has some important aspects with respect to computer processing in Sri Lanka. First, the general problem of computer installations is that they need a reliable service organisation, which limits the choice to machines marketed locally. Second, the few computer installations within reach of the scientific and technological system are all relatively small (by present standards) and the community of operators, systems engineers and programmers is correspondingly very limited. Third, a variety of different computers have been acquired (ICL, IBM), which further reduces the number of people experienced on each particular model. Apparently there is a lack of coherent policy and long-range planning concerning the development and utilisation of computer power in the public sector.

A modern minicomputer can be handled by a couple of well-trained computer experts who, in a computer-rich environment, always can rely on assistance from a large community of people with experience of all kinds of problems and unexpected events. In the small system the persons in charge of the installation will have to rely practically entirely on themselves with some help on the hardware side from the service organisation (which however will depend largely on exchangeable units). The vulnerability to "immobilization" due to discontinuity in systems personnel (resulting e.g. from attractive outside job offers) is obvious. It must therefore be foreseen that, even with well prepared and tested software packages, there may be frequent breakdowns of systems operations with long and painstaking efforts to find solutions or bypasses. The expected advantages of computer processing will therefore in practice be considerably reduced, although the technical possibilities are available and even the economical commitment could be justified. Due to the vulnerability of the small system, the reliability of computer processing may be expected to be much lower than in an environment with an established community of experts.

At present (Jan.-79) the following machines are operational within reach of the scientific and technical system in Sri Lanka:

1) Peradeniya University, engineering faculty: IBM 1130
2) Moratuwa University of Engineering: IBM 1130
3) State Engineering Corporation: ICL 1901 A (1968)
4) Mahaweli Development Board, Irrigation Department and Survey Department: ICL 2903 (not yet operative)
5) Ceylon Electricity Board: ICL 2900 (exact model not known to the reviewer)
6) Department of Census and Statistics: IBM 360/25
7) Examination department (Ministry of education): IBM 360/25

An IBM 370/125 will possibly be bought by UNDP for the Department of Census and Statistics. Further, IBM is now marketing the "System 34" and Wang Computer Corporation is marketing the model 2200 VS.

The older machines available in Sri Lanka cannot be used for the present applications. Of the modern systems, the IBM 34 is a business-oriented machine, which does not seem to be suitable for the application considered here. In principle the ICL 2903 now being installed (which is by the way less cost-effective than the

more recent model 2904) could be used for the I&D service discussed, and this is also the case for the IBM 370/125 (which is in the lower end of the 370 series and therefore rather uneconomical, in particular as the series is now going out of the market). However, it is doubtful whether either of these installations will be organized so as to provide external users frequent access, which is needed for many of the applications conceived of for the SLSTIC operations. Certainly a number of these operations might be done in a satisfactory way by using a terminal with CRT display and diskette-memory, although the processing would be less convenient. For educational purposes, which would be one of the main issues, it would be a rather restricted solution where many of the most interesting learning-by-doing effects would be difficult or impossible to realize.

The WANG 2200 VS seems to be a very interesting machine from which a configuration adequate for all purposes foreseeable in the present development programme could be designed. A text-processing facility will be introduced in March 1979 which can give rise to many applications in the library and documentation field (cf. 7.1.1). Further a FORTRAN compiler will be added in 1980, extending the utilization of the computer to scientific and engineering applications. The cost of a dedicated machine of this size would be rather high, seen in the perspective of the allocations for the research library system and the local cost of manpower (cf. 4.6). Yet, if the initial cost of some 100,000 US $ for the configuration considered (central processing unit with two disk drives, tape drive, CRT terminal, fast matrix printer and Diablo-type daisy-wheel printer), were to be covered by foreign grants, the remaining annual maintenance cost would be some 10,000 US $. This has to be seen in relation to the total spectrum of long-term advantages, and the entire development program of I&D services, of which the annual cost for the exogenous component only will certainly be considerably higher (cf. 2.6.3). Since support of the system within the customer organization is important, the Wang Computer Corporation offers free training of one systems engineer. In addition the services of their own systems engineer are made available during the initial stages of computerization.

It seems reasonable to conclude that it would in principle be possible to install and maintain a minicomputer configuration adequate for the applications sketched in various sections of the report, and with reasonable flexibility for future applications not yet defined. However, there are serious arguments in favour of a somewhat more prudent line of action, whereby the local computer-operations should be held at a lower level in the initial stages of the project:

a) The most important new services have to rely on external computerized information services anyway.
b) Part of the suggested local computer applications, e.g. the "Union Catalogue of Foreign Books" and the "List of Foreign Periodicals" can, with some good will on the part of administrators, be performed by input to an intelligent terminal and subsequent processing of files in an existing computer installation with sufficient capacity.
c) Other parts of the suggested computer applications (e.g. the centralized acquisition scheme) can be performed manually in a satisfactory way, as long as the system remains relatively small.
d) The above-mentioned vulnerability of a computer system in a small computer-community to breakdown decreases the reliability of operations. (The offer by Wang Comp. Corp. to supply training and services is helpful but does not eliminate the principal problem.)

The overall recommendations for SLSTIC therefore will be:

1) To introduce computerized current-awareness and retrospective searches by a bi-lateral agreement with an external I&D center (cf. 2.3).

2) To continue developing the co-operational scheme for better utilization of local resources, prefarably with a view to future computerization (as may be found appropriate). Further to introduce computer processing of selected routines by using an intelligent terminal as input device and establishing co-operation with a local (or external) computer installation of sufficient capacity to do the processing of files.
3) To train SLSTIC personnel on computer applications in the library and documentation field, to promote the external search services, and to establish a firm basis for a future minicomputer installation as the general development, requirements and local conditions grow more favourable for such extensions.

8. SRI LANKA SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (SLSTIC): HISTORY, CADRE AND OBJECTIVES

The idea of creating a Scientific and Technological I&D Centre giving a wide range of services to the entire community of R&D in Sri Lanka dates back to 1968 (ref. 5). The history of the project is quite illuminating, since it highlights the difficulties of getting past the planning stage into an operational activity with necessary international links and support.

8.1 Short history of the project 1968-78

1. In October 1968 the Department of Foreign Aid requested UNESCO to provide an expert to advise on the establishment of a "National Library and Documentation Centre (Scientific)" in Ceylon.
2. UNESCO sent Mr. S.L. Samarasinghe, programme specialist in its Department of Documentation, on a project identification mission in December 1968. The report was submitted in March 1969.
3. Suggestions for the establishment of a National Scientific and Technical Documentation Centre with the following main points were embodied in the report:
   (a) the Scientific Documentation Centre should be an autonomous institute which should work in close liaison with the National Science Council.
   (b) the Documentation Centre should function as a National Science Library.
   (c) UNDP aid should be sought to establish this Centre.
4. On the recommendation of the Ministry of Industries and Scientific Affairs the Cabinet decided in October 1969 to establish the Ceylon National Scientific & Technical Documentation Centre (CEYNSDOC, later to be referred to as NSTDC) with UNDP assistance.
5. In December 1969 the Government requested UNDP to provide an expert to advise the Government on preparation of activity plans (and design of buildings) required for the Centre. The Ministry of Industries and Scientific Affairs suspended this proposal for priority reasons.
6. In April 1972, the National Science Council suggested to the Ministry of Industries and Scientific Affairs that the Scientific Documentation Centre be established within National Science Council.
7. Meanwhile, in April 1972, the Ceylon National Library Services Board presented a project proposal to the Ministry of Planning for UNDP aids to create the National Scientific & Technical Documentation Centre (NSTDC) within the projected National Library.
8. In June 1972 a joint meeting of CNLSB and NSC was held to discuss the affiliation of NSTDC. At this meeting the compromise was decided that NSC should go ahead with the proposal of establishing NSTDC and it should subsequently be amalgamated with the Ceylon National Library when the latter starts functioning.
9. In October 1972 the Government submitted an application to UNDP for aid to establish NSTDC. UNDP was requested to provide $ 422,750 for 1974/77 and the

Government proposed to provide counterpart funds amounting to Rs. 1,241,320.

10. In May 1973 the Ministry of Planning had informed NSC that the proposal for NSTDC had to be dropped as it was not a high-priority project.
11. In September 1973 a communication had been received by NSC to the effect that CNLSB had dropped the idea of amalgamating NSTDC with the Ceylon National Library when it is established.
12. A fresh proposal for the creation of Sri Lanka Scientific & Technical Information Centre was submitted to UNDP in March 1975. It envisaged $ 320,520 from UNDP for the period 1975/78. The Government proposed to provide Rs. 1,048,627 as counterpart funds.
13. Again, in June 1975, the Ministry of External Resources deferred the project proposal as it was not a high-priority project.
14. Among the duties listed in the revised NSC Law No. 36 of September 9, 1975 was "to establish and maintain a scientific and technical documentation centre" serving the council and the research community at large.
15. In February 1976 the Cabinet approved that priority should be given to the establishment of Sri Lanka Scientific & Technical Information Centre. The proposal was re-submitted.
16. In October 1976 UNESCO requested NSC to revise the project proposals, particularly with regard to the training and equipment components.
17. In March 1977 the revised project proposal was submitted. UNDP was requested to provide $ 364,064 during the period 1977/81 for this project. The Government counterpart funds amounted to Rs. 1,157,300.
18. In July 1977 the project agreement was signed by the Government and in October 1977 by UNDP.
19. Soon after its formation in 1968, the NSC had set up a library to supply literature and other information needed for the work of the Council and its various Committees. Activities of this library naturally expanded into a number of important I&D services and co-ordinating functions in support of the system of research libraries in Sri Lanka. By 1978 the cadre had increased to 21 (7 vacancies) and the library took on the new name "Sri Lanka Scientific and Technological Information Centre" with the acronym SLSTIC.
20. By the end of 1978 a large number of the short-term objectives listed in the project document (mainly compilations, directories and co-ordinating activities) had been attained. These activities are pursued mainly with local resources.
21. As foreseen in the project document, a Unesco consultant has reviewed the activities of SLSTIC (Dec. 1978 - Feb. 1979) and made proposals inter alia for:
    a) continued development of present activities
    b) extension of I&D services by building up international links through a bi-lateral support arrangement with an established centre of excellence
    c) development of a spectrum of different training programmes
    d) establishment of a unit for statistics evaluation and research on matters related to the role of S&T information in a wider context.

8.2 SLSTIC activities 1978

Since SLSTIC has evolved gradually from the modest beginnings of a reference library for the NSC secretariat, and since a number of activities have started as NSC investigations but have later been (or will be) transferred to the Centre as regular activities, it is not possible to distinguish the specifically centre-originated results up till 1978. However, including certain NSC-work of clear information compilation character, the following account obtains for SLSTIC activities in the formative period.

(a) Co-ordinating the resources and services of research libraries with a view to: a) improve the quality of collections and series; b) avoid uneconomical duplication of material and operations; c) promote sharing of resources

The following I&D activities have been initiated:

- union catalogue of foreign S&T books (in the form of a bulletin and a card catalogue)
- union catalogue of foreign S&T periodicals (in the form of a card catalogue)
- co-operation plan for acquisition of abstracting & indexing journals
- stimulation of inter-library loan system
- book alert service
- general reference collection

(b) Assisting local libraries in procurement of materials by centralizing documentation and information services:

The following service have been started:

- photocopying service and photocopy procurement services (e.g. BLLD)
- patent procurement service (projected)
- NTIS document procurement service

(c) Acting as an information centre in fields where no special collections or I&D services are available:

The following subjects have been selected for acquisition:

- science policy, incl. philosophy of science (on request of MSC)
- science education (on request of NSC)
- environment
- patents
- library & information science (projected)

(d) Improving the skills of I&D personnel by way of:

- arranging workshops, seminars, etc.
- providing lectures
- designing in-service training programme

(e) Collection, acquisition, organization, analysis and storage of locally generated S&T literature:

The following services have been started:

- National Science Indexing Service (in the form of a bulletin and a card catalogue)
- National Scientific and Technical Reports Depository

(f) Preparation of publications pertinent to S&T including the following (year of latest edition given in brackets):

- Directory of S&T Periodicals in Sri Lanka (1979)
- Directory of S&T Institutions in Sri Lanka (1977)
- Directory of S&T Libraries in Sri Lanka (1978)
- Directory of S&T Personnel in Sri Lanka (1972)

Table 3: SLSTIC Cadre (1979)

Designation	No.	Scale (Rs./month)*	Qualifications	Identif. code	Duties**
Chief Librarian	1	1500 - 1900	A2 + P3 + E12	L1 (vacant)	--
Librarian/Publ Officer	1	1200 - 1500	A2 + P3 + E12	L2	a(iii); b(iii); d(iii) In charge of SLSTIC; Supervision of SLSTIC Projects; Book selection for SLSTIC Library; Secretary of Sri Lanka UNISIST Committee, etc.
Documentalist	4	600 - 915	A2 + P1 + E1 A1 + P2 + E1	D1 (vacant)	Administrative Ass't to head of SLSTIC
		-do-	-do-	D2	a(ii); e(i); Sri Lanka Science Index
		-do-	-do-	D3	d(i); d(iii); Training service; Union Catalogue of Periodicals
		-do-	-do-	D4 (vacant)	Documentation service
Libr. Assistant (II)	2	475 - 615	A1 + P1 + E3	LA1	c(iii); e(iii) S&T reports depository; Environmental inf. service
		-do-	-do-	LA2	a(ii); b(i) Photocopying service; Newspaper clippings; Assists. D3 in Union Catalogue of Periodicals
Libr. Assistant	5	375 - 480	A1 + P1	LA3	Acquisition for SLSTIC Library
		-do-	-do-	LA4	a(iv); a(vi) Periodicals registration (control); Cataloguing of SLSTIC acquisitions; SLSTIC Library Service; Interlibrary loans
		-do-	-do-	LA5	a(i); f(i-vii) Union Catalogue of Books; card filing, prep. of Bulletin; SLSTIC Publications (editing & distrib.)
		-do-	-do-	LA6	a(ii); a(v) Sri Lanka Science Index (editing); Book alert service
		-do-	-do-	LA7	Documentation (assistant to D4)

Repro. Technician	1	600 - 915	--	T1 (vacant)	(should be redesignated as computer and systems engineer)
Translator	1	600 - 915	A2 + E(2)	TR1 (vacant)	SLSTIC translation service (may have to be redesignated, e.g. for a computer programmer)
Steno/Typist	1	325 - 615	A1 + E3	C1	Clerical pool
Typist/Clerk	3	285 - 410	A1 + E1	C2	Clerical pool
Library Technician (II)	1	240 - 410	A0 + E1	W1 (vacant)	Photocop. service; microphotogr.; offset printing
Library Technician (II)	1	240 - 410	A0 + E1	W2 (vacant)	Binding; offset printing
Library Technician (III)	1	165 - 195	A0	W3	General jobs assisting SLSTIC operations

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Legend:
A0 = Junior School Certif.
A1 = General Educ. Certif.
A2 = Academic degree

P(I) = SLLA (I)
P(II) = SLLA (I + II)
P(III) = SLLA (I + II + III)

For SLLA (Sri Lanka Lib. Ass.) courses see Appendix VII

* 1979 Salaries increase: +10%
general allowance: +150 Rs.
deduction for providence fund: -10%

** Codes refer to list of SLSTIC activities 1978

- Directory of Foreign S&T Periodicals in Sri Lanka Libraries (1975)
- Directory of S&T Abstracting & Indexing Journals in Sri Lanka Libraries (1976)
- Directory of S&T Research Projects in Sri Lanka (1974)

8.3 The library of NSC/SLSTIC

The total expenditure for literature in 1978 was 60,000 Rs (approx. 4,000 US$) apart from external funds. Out of 169 foreign journals only 54 were purchased, 63 obtained as gifts, and 52 by exchange. The "Journal of NSC" accounts for 41 of the exchanges, the "Science Index" for the remaining 11. Of 20 abstracting and indexing journals (included in the earlier figures) only 4 were purchased, 3 obtained free (incl. GRA) and 9 by exchange (1 for the Journal and 8 for the Index). The remaining four important titles (Biol. Abstracts; Dissert. Abstracts; Excerpta Medica (39 series!); Science Citation Index) were obtained for 1978/79 from the Netherlands Literature program (see 5.3.1). The NSC has apparently not been requested to repay to counterpart funds (see Appendix II). (Excerpta Medica, which is particularly important in Sri Lanka since the data file at Lockheed is not easily available for searches, should be placed in, e.g., the S.L. Medical Library and negociated with the Netherlands General Literature Program for a long-term commitment - an exception from regular policy). The selection of secondary literature follows the co-operative distribution agreement for research libraries, initiated by SLSTIC (see 6.2.3). The material is of course available to visitors, but will later be used extensively for "manual" searches as professional staff of documentalists will be recruited and trained.

Apart from the reports depository (5.3.8) for local S&T writings a full set of Sri Lanka S&T journals is kept in the library for reference, and also for production of the "Sri Lanka Science Index". Certain categories of foreign reports are collected, like annual or activity reports from S&T institutions, reference works etc.

In addition, the library concentrates its acquisition of books (mainly bought from Bumpus, Haldane & Maxwell) and periodicals to a limited range of areas, namely "Science Policy and Philosophy & Sociology of Science", "Science Education", "Environmental Studies" and "Patents". It is suggested in the context of coming SLSTIC educational programs that one further area should be "Library and Information Science" (cf. 7.2).

The bibliographic and co-ordinating activities of SLSTIC were discussed in Ch. 6.

Since 1977 SLSTIC operates a photocopier, both for its own use and in the "inter-library loans" system to send copies in lieu of original documents (loans). The activity is so far rather insignificant, but it will grow steadily as the general appreciation of its advantages gains terrain in the research community. The present accounting principle (cf. 7.3.2) is not tenable for service on a larger scale. (The copier is Mita Copystar 900, with mobile frame and coated paper. It will have to be supplemented by a plain-paper copier.)

The SLSTIC publications are hitherto produced by stencil (in about 200 copies) on mediocre paper, which is detrimental to readibility and requires a rather spacious layout. A Ricoh 1010 offset printer has been installed in February - 79 and will hopefully contribute to better printing quality. With a changed layout, photographically reduced text (and double-sided printing), the use of paper of higher quality will not incur increased costs.

9. DIAGNOSIS OF DEFICIENCIES: THE SMALL SYSTEM SYNDROME

The reviews and analyses of the research system and the system for information provision demonstrate that, within the present organisational infrastructure and within conventional methods of resource sharing, a successful program for a co-operative network of research libraries has been established in Sri Lanka. It has also been pointed out that, with relatively modest inputs of resources for equipment and slight restructuring of procedures a long list of improvements could be attained. Yet, it will be clear that these only concern utilization and maintenance of the locally existing sources for information provision. In spite of such improvements some of the basic deficiencies remain, mainly related to the timely access to S&T information that is not available in the local system.

It was shown in section (4.3) that the isolation of a research system due to lack of personal contacts and more generally to non-presence in the "centre of events" gives rise to difficulties in remaining on the "research front". It also follows that the lack of direct communication links cannot easily be compensated by other sources of information. The predicament of the information provision system can be characterised as a "small system syndrome" with many different aspects and implications. Some are easily recognized:

a) Too small resources. A reasonable fraction of the total R&D expenditure does not permit maintenance of a sufficiently comprehensive library service, even within a co-operative programme for sharing resources. Important abstracting and indexing journals are available only at one (or at best two) places in the country. A more efficient use of funds is hampered by administrative difficulties. The shortage of funds and the distance to the centres of events combine to isolate the S&T system by lack of personal contacts.

b) Fragmentation of efforts: Among the many aspects of the small system there is the tendency of fragmentation of resources into nonviable or barely viable units with unclear objectives and the ambition to reflect (in miniature scale) the whole spectrum of organizations, associations and activities that can function autonomously only on a larger scale. It would seem that a prerequisite for the successful implementation of advanced I&D services is a clear statement of objectives for R&D, a clear distribution of responsibilities between the units involved in S&T information transfer with necessary authorizations and resources, and co-ordination in planning and performance of R&D services.

c) Too weak links with foreign I&D centers. In spite of bi-lateral, regional and international agreements, conferences and programmes, sometimes sponsored by international organizations (even referring to co-operation with I&D services in South Asia and South-East Asia, explicitly operating on a regional level), too little effect is obtained except for specific areas and projects. A clear distribution of responsibilities and declaration of rights seems to be needed.

d) Too expensive services from developed countries. The general photocopy service from the British Library Lending Division (BLLD) is expensive in terms of Sri Lanka library budgets (a large part of the cost being salaries). At present, service coupons are offered as part of the Overseas Development Ministry (ODM) literature programme, but is used only on a very limited scale. International computerized services in S&T information retreival are not used at all, due to pricing, lack of contacts and lack of experience. An exception is Medicine, where computerized searches (MEDLINE) are offered free by WHO, although with a weak back-up service programme for photocopies. The WHO-service is not used much, probably due to insufficient marketing and feed-back of evaluations, and also due to the small size of the community of potential users in Sri Lanka.

e) Lack of equipment. Photocopying is to-day an indispensable facility for providing scientific articles to R&D personnel and the only way of effectively

sharing resources within the research library system. At present very few machines are available in research libraries, mostly obtained from foreign aid funds. The situation would be greatly improval by supply of photocopiers to the large research libraries. Further, printing of various bibliographic products is done by stencil on very poor paper. A number of small or medium-size offset machines would allow appreciable improvement of the production. Microfiches cannot be used extensively due to lack of readers, and this problem would easily be solved by a relatively small investment from foreign aid funds.

f) Lack of educational programmes in modern I&D techniques and ideas. Library education in Sri Lanka is, understandably, rather conventionally oriented towards "classical" librarianship. There is a need for special courses in modern I&D techniques and ideas, and programmes for marketing services to the entire community of potential users. Courses should be constructed from a wide spectrum of modules that could be combined ad hoc corresponding to various needs and levels, for undergraduates, postgraduates and research staff, technical civil servants in Departments, R&D-oriented engineers etc., and for library assistants, librarians and the new profession of documentalists. Such programmes, the necessary textbook materials and the conducting of initial courses have to be worked out in co-operation with experienced educators in the I&D field, not available in Sri Lanka. Quite a few documentalists will have to get some kind of training and operational experience from active I&D-centres abroad.

It can be concluded that these problems can be mastered only in part by manipulation of the local system, involving some additional equipment and personnel. What is needed is a massive input of external services and external expertise to create a new concept of information provision with timely access to the world's S&T results approaching that available to researchers in the developed R&D systems. In different contexts in the review various components of such a scheme have been indicated. A comprehensive proposal is outlined in Ch. 2. This proposal relies heavily on the idea of a bi-lateral co-operative agreement with an advanced I&D-centre that takes on the responsibility to carry out the development work (whose details cannot be completely specified in advance) and to supply the external services needed during a certain period.

In the Sri Lanka National Paper to UNCSTD 1979 (U.N. Conference on Science and Technology for Development) the problem of access to the world's resources in S&T information is given serious consideration. This is highlighted in § 190 by a proposal to establish a "Global Centre for STD (Science and Technology for Development) Information Exchange" (ref. 9, § 190):

Adequate information dissemination can save a large amount of resources for each member state by avoiding duplication. Sri Lanka believes that it is necessary therefore for the UN to establish a Global Centre for STD Information Exchange, especially for the LDCs. In addition, Regional Centres should be established under the umbrella of UN Regional Commissions (e.g. ESCAP) to further emphasize the information exchange unique to the region. The objectives of this effort should be to:

(a) make available to the LDCs all the available STD information to assist in their development,

(b) produce STD information in developing countries to reduce the cost; e.g. books could be reprinted in the ESCAP region for distribution to English language developing countries,

(c) distribute STD information, on a shared cost basis, to member states, individuals and organizations,

(d) create and produce an abstract journal primarily concerned with STD,

(e) assemble a global STD information file available for retrieval by members for their own R&D efforts on an at cost (non-commercial) basis,

(f) become a global depository for all published STD information,

(g) negotiate with mercantile STD information owners (commercially produced books, tapes etc.) for reproduction in and distribution to the LDCs.

The proposals in this report (see Ch. 2) for development of S&T information services in Sri Lanka and in particular the role of SLSTIC go a far way towards creating a practical I&D services situation that approaches this virtual "Global Centre" from the user's point of view. It is shown that it is possible to do this on a scale harmonizing with the growth of demands operating by a combination of regional efforts and external services.

The feasibility of this venture should however be accompanied by some words of prudence. First, the fact that instruments and financing for comprehensive I&D services are provided does not necessarily imply that they are effectively available and used to their full capacity. We have pointed out three instances of apparently underutilisized facilities: the Union Catalogue of Foreign Books (6.2.1), the BLLD photocopy provision service (5.3.2) and the Medline searches (6.3.4). Plausible reasons could be found in each of these instances to explain the failure in effective use. Basically there seems to be a need for a reorientation of attitudes towards provision and consumption of S&T information. Users have to be made more literature-minded (and conscious of the obligations and objectives of research libraries) and the library staff more service-minded. This is not a simple and brief process. Rather it results as part of the development of the entire local S&T system as it becomes tied into its international counterpart. These ties create increasing demands from the research community for timely provision of current literature, and thereby new demands on the research libraries and I&D centers. The development also fosters a better awareness of the value of information and the potentialities of a co-operative network of national I&D resources. This evolution can certainly be enhanced by efforts in training and education of librarians, documentalist and all categories of users of S&T literature. But it would be unrealistic to expect a radical change of the attitudes towards S&T literature and the emergence of new (latent) needs only by offering new services.

One of the main problems facing innovation in this area is that of assessing potential needs. Since the researcher has to adapt his work to the prevalent situation, he will suppress those needs that cannot be fulfilled, and therefore new requirements will emerge only as new options are made available. The process of transition to a "Westernized" system of information provision will certainly not be smooth, nor will it be met by unanimous enthusiasm by all those for whose benefit new services are maintained. However, once it is decided to what level the services should be developed, it is mainly a matter of education and training to make the user community responsive to the new options of keeping abreast of the world literature in S&T, and to the responsibilities that these new options impose on them.

The active search for potential information needs, the development of awareness of new options for need fulfilment and a higher level of literature-mindedness and service-mindedness are all important aspects of the development of the small R&D system to a state where it can fit organically into the international system.

But it must be observed that the small system syndrome that besets the system of information provision to research, has a more fundamental counterpart in the research system itself. This has recently been eloquently and candidly analysed by M. Moravcsik and J. Ziman (ref. 30). A long sequence of factors are there outlined, that combine to decrease the efficient use of the available scarce resources for research and development and that work towards fragmentation rather than co-operation. While in some areas a certain overemphasis of centralized control makes research management difficult (e.g. 5.4). In other areas the lack of co-ordination of policy and operations gives rise to inefficient use of resources and even increases the small system problem (ref. 5.3.1 and 7.3.1). The international organisations themselves should perhaps by co-ordinating their programmes into blocks of overcritical size attain economies of scale that might justify systematic development schemes,

fragments of which could not form viable subunits (cf. 6.3.6). On the other hand the projects acceptable by local authorities necessarily reflect the present organization of R&D, and external inputs may even show a tendency to consolidate the very structures that ought to be reshaped in order to give a framework for the more long-range developments striven for. Some attention should at least be given to these problems so that balanced and a diversified set of actions can be set in at all points where simultaneous developments are needed to attain the overall goals.

There are other important limitations that should be taken into consideration in order to attune the expections of impacts of I&D services to a realistic level. Even if the R&D system is organized to make the best possible use of available resources by adequate administrative processes, co-operative schemes and functional objectives, and if an I&D service could be established that effectively provides timely access to the world literature (including a successfull effort to raise the general level of "literature-mindedness") some aspects of the small system syndrome would not easily be eliminated or bypassed. One is related to the lack of expertise in many areas so that, in spite of availability of "information", many problems would not be handled and many solutions to identified problems would not be found. A still more fundamental problem has to do with the role of documentation in the development of S&T systems. In an important sense, literature is a secondary effect to S&T advance, rather than the carrier of advance. The meaning of this statement is that in highly developed R&D systems there are a multitude of channels of information, that work in a complementary or functionally redundant way, whereby the literature (published research reports) is a very late offshoot of the information flow. Other ways of communication are so important and rich in relevant information, that the access to published reports is not enough to compensate for the non-access to the other resources. It is for example well-known that research papers tend to give a polished picture of the research process and do not in general report of failures and obstacles that add significantly to the experience finally embodied in the presented successful results. Another example concerns the evaluation of significant scientific claims (and more generally of trends of development) which, in spite of the supposedly open critical debate in science, tend to crystallize through informal communication in invisible colleges.

For similar reasons an R&D system that does not include a sufficiently broad research program will not be able to assimilate research results for application either. A viable R&D system like an organization is dependent on a subtle interplay of different partly redundant channels of information, some tacit, informal or even unconceptualized, to form a stable basis for further developments.

With an easily understandable metaphor (that should not be carried too far), the documentation of R&D is related to the system of R&D somewhat like the top of an iceberg to the submerged part: it would be senseless to try to transfer the top alone believing that it could grow a new base (read: the transfer of S&T information does not by itself guarantee the growth of a socio-technological infrastructure). This relationship is still stronger in technology than in science, due to a combination of the restricted role of reporting in the development of technology and economic restrictions that hamper a free flow of information.

One conclusion must be that the policies for use of resources for development of S&T information systems have to be designed to harmonize with the systems that are supposed to absorb and assimilate the information. Although it is possible (as showr in Ch. 2) to create a system for information provision that meets the objectives of approaching services offered in developed R&D systems (cf. Ch. 3), this will not be meaningful unless corresponding care is taken in developing the ability of the R&D system proper to use the information services provided.

In order to come to a decision concerning an appropriate level of operation it would seem advisable to perform a more thorough study of potential needs and requirements. This could be done as a committee work similar to the work recently presented as the report "Scientific and Technical Information Provision in Sweden" (ref. 29) but with emphasis on the particular problems facing R&D in Sri Lanka.

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APPENDIX I

RESEARCH MANPOWER AND PRODUCTIVITY IN SRI LANKA - A CASE STUDY AND SOME CONJECTURES

I: Introductory remarks

It is extremely difficult to obtain reasonably consistent and comprehensive data on research manpower and productivity within different areas of Science and Technology in Sri Lanka. There are many reasons for this. Primarily, official statistics giving sufficient detail are as a rule not available from the institutions concerned. Further, in order to comply with the objectives of R&D funded by government, the definition of an "R&D project" has to be made much wider than the original "academic" one. In consequence it is not evident who should be regarded as being "involved in R&D activities". Finally, the traditional indicator of scientific productivity, namely the output in terms of publications in scientific journals (and the still more problematic measure of citations) is not strictly applicable in technological development work, however innovative this may be. It will be still less relevant when the R&D effort has to be defined with a main emphasis on local needs and in areas where there is no established international (or even regional) forum and instruments for dissemination of results.

An obvious contributing factor to the difficulty in assessing R&D outputs is the fact that much work, if eventually documented at all, will be presented in the form of unpublished (confidential or otherwise restricted) reports which are not available even in the institution's own library.

Interpretations of data on R&D manpower and productivity must therefore be done with extreme caution. Conclusions must be taken with more than "granum salis" and should at best be used as contributions to discussions of policy issues.

In the hard sciences the situation is a bit easier to handle. Yet a study restricted to such areas may, in conjunction with other available data, yield some indications about the general structure of the system at large, e.g. as to its size and potentials for growth, and also concerning the way it links into the international system of R&D.

II: Basic data for the study

With this in mind a small "bibliometric" study was undertaken, where material from a number of publications from the National Science Council of Sri Lanka could be utilized (refs. 1-3):

Ref. 1) list projects in about 110 departments in 42 organizations involved in R&D activities. University departments carrying out research are counted separately as are departments of major research institutes. The areas covered are: physical sciences, life sciences, medicine, agriculture and engineering. (Social science research projects are included only in a rather selective way.) 600 individuals are listed. Names associated with the research projects in general also appear as authors of project reports and publications. It can therefore be concluded that the persons listed are actively involved in research, although a fair number of them may be junior scientists or research students. An upward adjustment of perhaps some 100 has to be made for incompleteness in the survey. The areas have been defined following the OECD "Frascati Manual" (1970 edition).

Ref. 2 lists about 1200 individuals reported by research institutions to be qualified as "S&T personnel" on their staff. The criterion seems to be the holding of some academic degree. Many individuals listed are obviously engaged in nonresearch activities, e.g. administration or various kinds of technical professions. There is also a remarkably small overlap of names common to the two lists: only 45 out of 154, i.e. less than 30% of chemists listed in ref. 2 appear in the name index of ref. 1. The list

of institutions surveyed in ref. 2 is not supplied, but presumably all important organizations involved in research in S&T are included (also agriculture, medicine, and social sciences, but not humanities).

Ref. 3 is a scholarly product in bibliography. It covers natural and life sciences, but excludes agriculture, medicine, technology and other "applied" areas, and also excludes humanities and social sciences. It claims to list publications in "basic" science written by local (i.e. Sri Lanka) scientists in the period 1960-1976. A total of 2335 items are listed. The index lists about 1000 names, of which some 500 contribute one paper only, in good agreement with the situation in the scientific system at large.

III: The area of chemistry

The area of chemistry as a "basic science" is suitable for a study of research manpower and productivity since it is relatively well-defined, (even if the "basicness" may sometimes be disputable).

Ref. 2 lists 154 persons as "S&T personnel in chemistry". Looking at the employments the following situation obtains:

Affiliation	University Departments	CISIR	Other research labs, special or industrial	Administrative etc.
Number of persons	19 (4 professors)	31	91	13

Table 1: Affiliation of 154 persons listed in ref. 2 as "S&T personnel in chemistry".

Ref. 3 lists 492 items under the heading of chemistry. However of the 154 persons listed in ref. 2 only 55 can be identified in ref. 3 as authors of papers (in the area defined for the compilation) during the period 1960-1976. A look at the projects in ref. 1 with which these names are associated shows that most of this research is done at the University chemistry departments and at the CISIR (Ceylon Institute of Scientific and Industrial Research).

A survey of the writings of these 55 authors as presented in ref. 3 gives the following result, there "authorships" are counted, i.e. multiply authored papers give rise to one "author-ship" for each contributing author (as a matter of fact only 37 such cases were found within the sample, although multiple authorship is a quite common phenomenon in chemistry; this might be taken to indicate that persons listed in ref. 2 are usually senior staff, whereas many authors of papers in ref. 3, and also many co-workers in ref. 2, are fairly junior).The distribution of authorships is given in table 2.

Authorships	1	2	3	4	5	6	7	8	9	10	11	12	15	18	34	35	91
n:o of authors in sample	20	8	4	6	5	1	1	0	1	3	0	1	1	1	1	1	1

Table 2: Distribution of authorships in sample of 55 authors appearing under "chemistry" in both ref. 1 and 3.

On close inspection of the data (see appendix 1) some interesting observations can be made. The 55 authors of the sample represent a total of 356 authorships with about 320 different papers, of which about 270 are classified in ref. 3 as chemistry, while most of the remaining 50 are classified as geology, biochemistry or plant physiology.

The following distribution of authorships obtains:

Affiliation	n:o of authorships	% of	n:o of authors	% of	Comments
University	216	60%	14	25%	Including 5 authors with 91, 35, 18, 15 and 12 authorships respectively
CISIR	95	25%	18	35%	1 author having 35 authorships
Other	43	15%	23	40%	

Table 3: Distribution of authorships according to affiliation

Of the 55 scientists as many as 39 (almost 75%) held some degree in a foreign university, where 32 are from the U.K., 3 from Canada and one each from Australia, Czechoslovakia, India and U.S.A. External education does not, on the other hand, predispose for a high productivity. Out of the 20 authors with single authorships 12 (i.e. 60%) had external degrees. Looking at high-scoring authors, e.g. having 5 or more authorships, there are 17 all of whom have external education, 13 having a Ph.D. degree. These 17 authors represent 282 of the total of 354 authorships in the sample.

What matters most is the affiliation. Only few institutions are involved with projects that are reported in a way to be recognized as "basic science", foremost universities and CISIR.

As appears from table 3, staff employed in 1974 in university institutions (25% of the sample) represent 60% of the authorships and staff at CISIR another 25% of the authorships with some 35% of the sample. This leaves only about 15% of the authorships to be produced by 40% of authors with other affiliation in 1974. (Unfortunately it is not possible to check the affiliation at the time of each authorship. If a large number of papers were produced while the authors were on leave for postgraduate studies abroad, this might in part explain the low rate of papers jointly authored by members of the sample. A thorough study of research productivity in Sri Lanka would have to take this factor into account. If such papers were to be excluded from the review the total output might be considerably reduced).

A comparison of the projects listed in ref. 1 and the papers listed in ref. 3 shows that the latter includes results from a large number of projects listed in ref. 1 as "Industrial Chemistry". The classification "pure research" is obviously not clearcut - there are degrees of "applied research". The demarcation line drawn in ref. 3 seems for example to exclude much of the research done at the Rubber Research Institute. Obvious as this general remark may seem, it has some interesting consequences for the assessment of R&D manpower in Sri Lanka.

IV: Conjectures on the R&D manpower situation in Sri Lanka in 1974

The gross data we have available for conjectures are as follows:

I: Ref. 1 lists about 600 persons as directly involved (1974) in projects in most areas except humanities. The list is not complete.

II: Ref. 2 lists about 1200 persons, where however a sample (albeit nonconclusive) indicates that only 400 were actively involved in research projects in 1973. Most areas are covered, except humanities. Completeness and also criteria for inclusion are difficult to assess.

III: Ref. 3 lists about 1000 persons actively involved, sometime in the period 1960-1976, in "basic research" in science excluding a number of areas like agriculture, medicine and also humanities and social science. However, the demarcation between what is included as "basic" and what is excluded as "applied" is not clear.

IV: In appendix 3 the distribution of teaching staff (professors, assoc. professors, lecturers, assist. lecturers) in Sri Lanka university faculties is given (information extracted from ref. 4). It should be remarked that in many instances only undergraduate education is offered, that postgraduate courses, where available, are offered only in a limited number of areas, and that only few doctoral programs are available. This has restrictive effects not only on the recruitment of research students, but also on the possibilities for faculty staff to conduct research along with teaching obligations.

V: Ref. 5 claims that in 1975 the total expenditure on R&D for all areas (excluding capital costs) was about 32.7 MRs of which (see ref. 5 p. 41) about 65% is spent as personal emoluments, i.e. mainly salaries. A mere 3% is spent on the "higher education" sector, which may be taken to mean "academic research", since much "applied research" is pursued within institutions for higher education. The undergraduate education component of university expenditure, which of course accounts for a major part, is of course excluded in the estimate.

The figure of 3% seems to tell more about the classification of research projects than of the university-based contribution to research, which clearly represents a much larger share (in chemistry about 25% of the manpower and a much larger share of the output). The distinction between "pure" and "applied" is open to much adjustment in response to external pressure (political and financial) and is therefore not very useful in the present context.

VI: Finally it is possible to estimate the average annual salary within R&D institutions (management, research officers, research supporting staff, clerical and workshop staff etc., as roughly Rs 8000 (1974). This estimate is based on data given in a number of annual reports from the period (e.g. ref. 6) and is admittedly uncertain. An "intelligent guess" would, though, suggest that the "correct" value is within - 10% and + 20% of the value quoted.

Now assuming that the data referred to under I-VI are reasonably reliable, it seems possible to make some conjectures on the manpower structure, which should at least be indicative of the true situation.

The amount available for salaries being about 21.5 MRs a division by 8000 Rs yields an estimate of about 2700 employees. Now assuming further that somewhat less than 1/3 of these should be regarded as S&T personnel (actively conducting research) this gives roughly 900 "scientists" in all areas. To what extent is this value compatible with the other data available?

Clearly the estimate of 400 individuals active in R&D projects in the area defined by ref. 2 is plausible per se considering the fact that it seems to list fairly senior people of whom many have gone into industrial development or into administration. This also compares with the 600 persons listed in ref. 1, even if adjusted to 700 as indicated earlier, as active in R&D projects of whom many seem to be fairly junior (e.g. research students having no earlier publications).

Now for the 1000 persons listed in ref. 3 as active in "basic research" in sciences (excl. agriculture, medicine etc.) in the period 1960-1976, it is not unreasonable to assume that no more than 1/3 are active at a particular time. Even taking into account a certain growth during the period - there have also been periods of recess - the number of 400 for the areas covered seems fair. This daring conjecture is based on the experience that the large number of 1-or-2-paper-authors usually drop out of the system of research. It is also interesting for the present line of argument to consider the distribution of University staff given in appendix 3, keeping in mind the restricted number of post-graduate programs and the very scarce research facilities.

These arguments seem to be compatible with the conjecture that the structure of research manpower (graduates actively involved in research) in SriLanka (1974) might has the following appearance (including perhaps as much as 30% fairly inexperienced research staff in need of research supervision):

Science & Technology (incl. Agriculture, Medicine etc.), with the breakdown	700		
a) University component (only research)		250	
of which "academic" science			100
and "applied" science			150
b) Research institutes: CISIR, RRI, CRI, TRI, CARI, etc. (cf. ref. 8)		350	
c) Industry		100	
Humanities and Social Sciences	200		
	900		

Table 4: Conjecture concerning the distribution of S&T manpower actively involved in research in Sri Lanka (1978).

A new survey of S&T manpower is presently under way in the National Science Council. Rather comprehensive data, following the Unesco recommendations on manpower studies, have been assembled and are processed by computer. No results are as yet available. The scope of the survey is, however, much wider than to include only individuals actively carrying out research programs. It covers all persons holding a degree in science or technology and/or having professional experience in related areas. A tentative number of 6000 has been quoted. This figure can be compared to the roughly 1400 members of the Sri lanka Association for the Advancement of Science (according to the membership register updated to July 1978 (ref. 7) where many entries are institutional memberships) generally supposed to represent the S&T system rather comprehensively.

The figures given in the research manpower estimates are obviously extremely rough, but the overall picture is all the same quite interesting. It gives rise to a number of policy issues with respect for example, to research funding, and to developments in higher education. Of particular interest to the author are the implications for policies in the provision of scientific and technological information, and for an appropriate structure of information and documentation services.

The research community is very small and scattered over a number of places and institutions all over the country. Yet there is within this community a wide spectrum of objectives, from basic "academic" research, through applied research and development to practical applications and extension programs with corresponding information needs in a wide range of areas. It seems virtually impossible to keep a reasonable library standard (periodicals, reference works and monographs) within a reasonable fraction of the total research budget - it is already larger, relatively, than what is normally the case in Western research systems. There are already a large number of specialized information and documentation (I&D) activities based on these restricted and scattered information resources. In spite of highly qualified management, the resources and equipment available do not permit more than a rather narrow scope, insufficient to give comprehensive up-to-date I&D services even in restricted fields. Further, there are inevitably areas of overlap since all applied research is multidisciplinary, and this gives rise either to duplication of efforts or to problems of co-ordination and distribution of responsibilities.

A rational I&D policy, given the present conditions, seems to be to spend available resources mainly to cater for immediate needs of on-going research programs, with rather short term objectives. A core set of important reference and indexing journals has to be readily available for "manual" searches, and the combined holdings of journals (with an up-to-date union list of journals in Sri Lanka research libraries) made accessible by a regular photocopying service within an interlibrary co-operation agreement. A union catalogue of foreign scientific books within the research library system should be produced in such a way that a reasonably up-to-date cumulative version can be made available to the users in each research library. By computerized techniques this could be achieved in the COM-microfiche (computer

generated) form, the input being made in the documentation center (SLSTIC) at the National Science Council of Sri Lanka and the file possibly being processed abroad initially. Since research training abroad will always be available only to a few (elite) students, measures have to be taken within the research system to reduce the present very strong dependence on such external training and on personal contacts obtained in the context of studies abroad. This process will involve

a) special training (not only for staff professionally involved with I&D services, but also research staff and students in the use of scientific and technical literature;
b) an emphasis on a strong interaction (feedback) between users and suppliers of information, which will require trained information officers in the field of S&T, acting as intermediaries between users and available systems and sources of computerized I&D services;
c) co-ordination of the supply of I&D services to avoid overlaps in efforts, and
d) appropriate international, regional and bi-lateral agreements to make international and other individual oriented I&D services available, along with effective back-up in terms of (free) photocopies, to R&D projects in Sri Lanka.

A program of this kind, to become effective, will need not only initiating resources for equipment and training. In the foreseeable future some external funds will be needed to keep up a continuity in the external I&D services which will be a necessary component in a functioning system for provision of scientific and technological information to the research community in Sri Lanka. Even if this support can be obtained, the program will put high demands on active involvement from this community, since a much higher percentage of its members than is currently the case in the West, must take on responsibilities to act as "information gatekeepers" in order to create an environment where the S&T information provided can be effectively assimilated.

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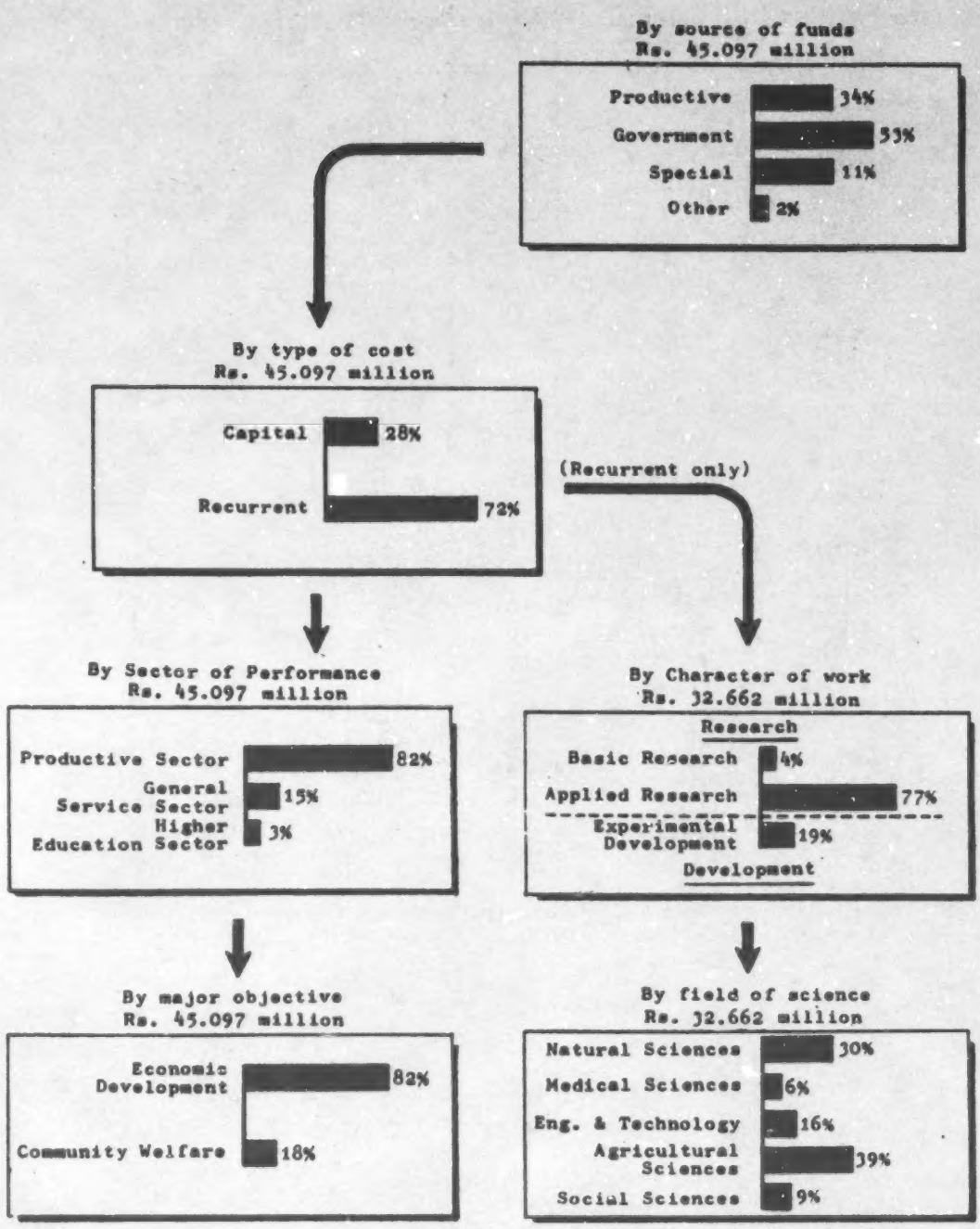
(8) (Directory of) Scientific and Technical Institutions in Sri Lanka 1976 (National Science Council, Colombo 1977)

Authorships	Affiliation	External education	Authorships	Affiliation	External education
1	CISIR	-	3	Other	-
1	Univ.	PhD., UK	3	CISIR	-
1	Other	-	3	Other	BSc., Ind.
1	Other	PhD., Can.	3	Univ.	PhD., UK
1	Other	BSc., UK	4	Univ.	PhD., UK
1	Other	-	4	Other	PhD., UK
1	Other	MsC., UK	4	CISIR	-
1	CISIR	-	4	CISIR	-
1	Other	PhD., Can.	4	CISIR	-
1	CISIR	-	4	Other	PhD., UK
1	Other	MSc., UK	5	Univ.	PhD., UK
1	Other	BSc., UK	5	Other	MSc., UK
1	Other	PhD., Austr.	5	Univ.	PhD., UK
1	CISIR	-	5	CISIR	PhD., UK
1	Other	-	5	Other	PhD., UK
1	Other	PhD., UK	6	Univ.	PhD., UK
1	Other	PhD., UK	7	CISIR	PhD., Can.
1	Other	PhD., USA	9	Univ.	MSc., UK
1	Other	-	10	Univ.	PhD., UK
1	Other	PhD., UK	10	CISIR	Dipl., UK
2	CISIR	-	10	CISIR	Dipl., UK
2	CISIR	-	12	Univ.	PhD., UK
2	Other	BSc., UK	15	Univ.	PhD., UK
2	CISIR	-	18	Univ.	PhD., UK
2	Univ.	PhD., UK	34	CISIR	PhD., UK
2	CISIR	MSc., Czech.	35	Univ.	PhD., UK
2	CISIR	PhD., UK	91	Univ.	PhD., UK
2	Other	PhD., UK			

Appendix 1: Data on the sample of 55 Scientists discussed in Section III.



Appendix 2: Distrib. of Expenditure on R&D 1975 (ref. 5, p. 31). An overall fraction of 65% of the "recurrent expenditure" is given for the personal emoluments of staff involved in R&D (ref. 5, p. 42).

Univ. (campus) faculty	Colombo (1967)	Jaffna (1974)	Katubedde (1972) (Moratuwa)	Peradeniya (1942)	Vidyalankara (1959) (Kelaniya)	Vidyodaya (1959) (Sri Jaya-wardenepura)	Ruhuna (1978)	Sum
Arts & Soc.Sci.	60 (55) 6	9 (7) 0		85 (70) 3	62 (46) 1	51 (36) 2		267 (214) 12
incl. Econ.	61 (3) 13	33 (1) 0		38 (2) 8	46 (4) 5	28 (1) 7		196 (11) 33
Educ. & Law	2762	350		2043	1815	2062		8032
	39 (37) 3	6 (6) 0		47 (46) 0	27 (24) 0	16 (16) 1		135 (129) 4
Sciences	37 (1) 15	17 (1) 0		35 (1) 21	19 (2) 3	27 (0) 7		135 (5) 46
	627	355		638	213	222		2055
Engineering			42 (27) 2	28 (28) 0				70 (55) 2
incl. Archite.			47 (4) 24	15 (1) 12				62 (5) 36
			2574	625				3199
				13 (13) 0				13 (13) 0
Agriculture				24 (2) 12				24 (2) 12
				408				408
				7 (7) 0				7 (7) 0
Veter. Sci.				8 (2) 1				8 (2) 1
				109				109
Medicine	69 (30) 10			63 (30) 6				132 (60) 16
incl. Dentistry	1 (0) 0			17 (1) 6				18 (1) 6
	508			611				1419
	168(122)19	15 (13) 0	42 (27) 2	243(194)9	89 (70) 1	67 (52) 3		624 (478) 34
Sum	99 (4) 28	40 (2) 0	47 (4) 24	137(9)60	65 (6) 8	55 (1) 14		443 (26) 134
	4197	605	2574	4434	2028	2284		16122

Appendix 3: Distribution of educational options (faculties or equiv.) in the Sri Lanka University system (until 1978 united as Univ. of Sri Lanka, from 1979 organized as seven autonomous universities). Figures give distribution of faculty staff and students (1975). Data are extracted from ref. 4. Each entry ("faculty") is presented in the form

P1 (E1) L1
P2 (E2) L2
N

where
P1 = professors and lecturers (positions),
E1 = number of professors/lecturers holding postgraduate degree from foreign university,
L1 = number of professors/lecturers on leave
P2,E2 and L2 are defined in analogy for the group of assistant lecturers, and
N = number of students.

APPENDIX II

BUDGETING FOR FOREIGN AID

A brief discription of the budgeting principles for foreign aid seems appropriate here for reasons related to financing of library and information services. Instructions to be followed in utilization of foreign aid funds are given in Treasury Circular No. 826, April 30, 1976 and No. 828, July 19, 1976. A main distinction is made between "Capital Aid" (subdivided into the categories "Grants" and "Loans"), "Technical Assistance", and "Commodity Aid".

The following paragraphs are quoted from Treasury Circular 828:

Provision in the Estimates

4. As all Capital Aid is integrated with budgetary expenditure its utilisation should be provided for in the Annual Estimates. Foreign Capital Aid should not be utilised unless and until financial provision has been made for it either in the Annual Estimates or by means of supplementary estimates or by "Virement" procedure. Where it is found necessary to utilise any Capital Aid in respect of which no provision exists in the Annual Estimates, provision should be made for the purpose by means of a supplementary estimate or "Virement" procedure. Even a liability should not be incurred in anticipation of Capital Aid until at least the approval of the Cabinet has been obtained for the scheme or project which is to be financed from Capital Aid.

. . . . . .

5:4 Grants in Cash or from Counterpart Funds. - When cash is received in the Treasury by way of remittances or by way of Counterpart Funds generated from Commodity Aid, for the purpose of financing specific projects, the cash will be credited to the appropriate Grant A/c. in the Treasury pending utilisation by the relevant projects. The Departments receiving cash remittances direct from Donors should also deposit such receipts in the Treasury. When provision is made in the Estimates for utilization of such Grants, the Departments should apply to the Director of Accounts and Payments through the Director of External Resources, for an allcoation of funds from the relevant Grant Account and obtain it before incurring any liability or expenditure. The allocation should be noted in the folio of the Departmental Appropriation Ledger where the relevant Foreign Aid provision in the Estimates has been noted and all expenditure should be debited to the provision in the estimates.

7:2 Technical Assistance in the form of services of Experts, Scholarships and Training Facilities does not affect the budgetary expenditure of the Government and therefore no financial provision need be made in respect of such assistance in the annual Estimates of expenditure.

6. Charging of expenditure to Grant and Loan Accounts in the Treasury at the end of the year. At the end of the Financial Year the Grant and Loan Accounts which were originally credited will be debited by the Director of Accounts and Payments with the value of aid received and actually utilised during the financial year, and the Expenditure Account in the Treasury Main Ledger will be credited with such amount. The Foreign Aid Expenditure will remain debited to the provision in the Estimates.

The general principles of operating with "Counterpart Funds" follows from internal budgetary arrangements for control of foreign aid funds. By virtue of these arrangements, when a grant (etc.) is received by Sri Lanka to be allocated to a particular institution, a request has to be made by that institution to the Treasury for

extra funds (in Rs.) covering the value of such donations. The request is normally made in the budgetary process (annual estimates) during the year preceding the year of utilization.

Through this procedure an important distinction may arise in the effect of a foreign aid grant as perceived by the Government and by the recipient institution respectively. Foreign aid programs are as a rule agreements on a Government-to-Government basis. This means that the Government has the prerogative to decide, in each case, whether the foreign aid funds made available for a particular project are to be perceived as additions (on top of) expected "regular" allocations in the national budget, or as part of such allocations. Irrespective of whether or not "extra" allocations (in Rs.) are released by the Treasury in response to a budgetary estimate of expected foreign aid, the corresponding amount has to be repaid to "counterpart funds" on receipt of the foreign aid.

In practice this may imply that a program for e.g. capital aid in the form of equipment to a research institution will in fact be perceived (from the institution's point of view) as if part of its "regular" allocations were paid by foreign aid instead of from "government funds". Likewise, a condition of repayment over a couple of years to "counterpart funds" may in practice mean that a foreign grant, from the institution's point of view, is transformed in to a loan to be repaid a "regular" expected allcoation. And deliveries received free by the Government as "commodity aid" can be sold to a group of recipients, the income being subsequently invested in other development programs.

If therefore, a grant is to be perceived as an additional asset, an additional allcoation has to be made in advance as a result of the budgetary process. In case this normal procedure of pre-allocation cannot be followed, e.g. for timing reasons, there are provision for an emergency procedure:

5:2 Gifts of Equipment and Materials for which Provision has not been made in the Estimates at the time of receipt. - Gifts of Equipment and Materials can be received from Foreign Governments and Agencies in special circumstances like floods, epidemics, droughts, etc., and for other specific purposes which may not have been anticipated at the time of preparation of the Draft Estimates. Departments are requested to keep separate records of these gifts in their, Inventories or other Registers. Provision should be made by "Virement" procedure or by supplementary estimate if possible during the year of receipt and the value should be brought to account [....]. The value to be brought to account is the exact value if known or an approximate value determined in consultation with the Director of External Resources. If "Virement" procedure or supplementary estimates procedure cannot be resorted to during the year of receipt, provision should be made in the following year's Estimates for the purpose of bringing to account the value of the gifts. Where the value is not brought to account in the year of receipt, the Appropriation Account of the Department for that year should contain a foot-note giving the description and value of Foreign Aid Gifts received but not accounted during the year.

It seems, from several discussions on incidents where claims for repayment of foreign aid grants to "counterpart funds" have been made by the Department of External Resources, that research managers may be insufficiently aware of the exact meaning of these regulations, their interpretation and implications. This appears in particular to be the case with librarians, who presumably have to put in their budget estimates at an early stage in the budgetary process on the institutional level and may not be involved in the final stages of the process.

The consequence is, however, that requirement of repayment frequently seem to come as a great surprise, and that in certain cases (an example is rendered by the Netherlands Literature Program discussed in section (5.3.1) available resources of the report have not been used to the intended effect of supporting library acquisition programs.

It is not surprising that, as in the example mentioned where funding is presented on an ad-hoc basis, the administrative procedures have given rise to management difficulties. An idea for simplification of such cases, yet consistent with the regulations, will be indicated in the chapter on "Functions of SLSTIC" (2.2.1).

It is important to note that there are exceptional cases where the regulations do not seem to apply. One is the ODM (Ministry of Overseas Development) program, adminsitered by the British Council and providing a considerable amount of scientific literature to institutions of research and higher education. The same seems to be the case for grants administered by UNDP (see Annex I "Organization of the Project" standard formulation joined to project documents), as a result of special agreements with the Government of Sri lanka. Equipment provided for projects under UNDP grants remains the properly of the funding agency until the project is terminated. This is not the case, for example, with SIDA (Sweden)-supported projects, where ownership to equipment on the contrary is transferred immediately on delivery. This difference is certainly reflected in budgetary procedures as outlined.

APPENDIX III

PRESENTATION OF SOME RESEARCH INSTITUTIONS AND ORGANIZATIONS IN SRI LANKA

(Where not explicitly stated otherwise, these are auto-presentations drawn from the publication "Scientific and Technical Institutions in Sri Lanka 1976" (National Science Council of Sri Lanka, Colombo 1977))

1. General

1.1 National Science Council of Sri Lanka, Colombo
Established 1968, Professional Staff (1979):10
Duties of the Council (quoted from NSC of SL Law No 36, 1975):

(a) to advise the Minister on
- the application and utilization of science and technology for the development of Sri Lanka;
- the formulation of a science policy;
- the allocation of funds for scientific and technological research; and
- any other matters that may be referred by the Minister to the Council;

(b) to initiate, sponsor and support scientific and technological research with the following objectives
- the development of the resources of Sri Lanka;
- the promotion of the welfare of the people of Sri Lanka; and
- the advancement of science and technology in general in Sri Lanka;

(c) to collect, disseminate and publish information relating to scientific and technical matters;

(d) to establish and maintain liaison with scientists and technologists and scientific and technological institutions in Sri Lanka and in other countries;

(e) to study and report on:
- the effective utilization of the available scientific and technological personnel in Sri Lanka;
- the future scientific and technological manpower requirements for the effective implementation of the science policy of Sri Lanka; and
- the steps to be taken to provide adequate training facilities to meet future scientific and technological manpower requirements;

(f) to take cognizance of and report on subjects of national importance concerning scientific, technological, educational, sociological and economic matters in Sri Lanka; and

(g) to do such other things as may be necessary for the development of science and technology in Sri Lanka.

The Council sponsors research in the following areas (quoted from NSC Act No 9, 1968):

- Pysical Science Research
- Biological Science Research
- Agricultural Science Research
- Industrial Research
- Medical Research
- Social Science Research

The Council has established a number of working committees (NSC Annual Report for 1976, Colombo 1978-06-01):

- Research grants and scholarships board
- Working Committee on Science Policy Research
- Working Committee on Science Education Research
- Working Committee on Scientific and Technical Information
- Working Committee on Environment
- Working Committee on Social Science Research

The Council also co-ordinates work of:

- National Committee for UNISIST
- National Committee on Man and Environment

The Sri Lanka Scientific and Technological Information Center (SLSTIC) is organized as a division within the NSC. The objectives of the Working Committee on Science Policy Research are particularly noteworthy with respect to potential requirements on information services, and are here quoted in extenso (from NSC Annual Report for 1976, Colombo 1978):

- enunciation of a National Science Policy;
- to advise the government and other bodies to overcome and prevent problems, often caused by incorrect use of science;
- to take the message of science to the people and get their involvement in the development of science;
- to study the factors responsible for the selection of grantees for fellowships and to propose alternatives;
- to study the problems of instrumentation and related factors;
- to get the maximum patronage and support from the Government to develop science and to convince the Government that Science has not been given its due place;
- to request the Government to implement resolutions drawn up by UNESCO and other committees regarding scientific personnel.

Publications: Journal of the National Science Council of Sri Lanka; Vidurava; Sri Lanka Journal of Social Sciences; Studies related to Working Committees; Publication of SLSTIC.

1.2 Sri Lanka Association for the Advancement of Science (SLAAS), Colombo
Established 1966(1944); Membership (1979):1400.
Objectives (quoted from Act of Parliament No 11, 1966):

- to promote the advancement of Science (pure and applied);
- to provide for systematic direction of scientific inquiry in the interest of the country;
- to promote contact among scientific workers;
- to hold an Annual Session;
- to disseminate scientific knowledge;
- to do such other things as may be necessary for the advancement of Science.

The Association provides for the following sections (Rules of Dec. 19, 1974):

Section A: Medical, Dental and Veterinary Sciences;
Section B: Agricultural Sciences and Forestry;
Section C: Engineering, Architecture and Surveying;
Section D: Natural Sciences (Botany, Zoology, Fisheries, Geology and Mineralogy);
Section E: Physical Sciences (Chemistry, Biochemistry, Physics, Mathematics, Statistics, Astronomy and Meteorology);
Section F: Social Sciences (Anthropology, Archaeology, Demography, Economics, Education, Geography, Psychology and Sociology).

There shall be (Rules of Dec. 19, 1974) within the Association a General Research Committee with the purpose of furthering scientific and industrial research and of extending and maintaining scientific research of national importance. The General Research Committee shall:

- study, report and take suitable action on scientific problems with a bearing on the national interest, with special attention to the initiation and/or the development of the necessary research;
- advise any member or group of members of the General Committee on a specific research project on which any member or group may need advice;
- institute and supervise research studentships and fellowships with the approval of the Council in the name of the Association;
- advice the Council on any matter of scientific importance;
- take any other action it considers necessary in accordance with its specific functions;
- make an Annual Report to the Council.

Also, there shall be set up within the Association a Committee for the popularization of Science. This Committee shall:

- take suitable action to popularize science with a bearing on the national interest;
- advise the general public or any person and/or institution on the application of scientific methods to various activities in their day-to-day life with a view to create an attitude in them on the scientific way of thinking.
- do all other things as may be considered necessary and are incidental to the above functions with the common objective of popularizing science;
- make semi-annual and annual reports to the Council.

Publication: Proceedings of SLAAS.

1.3 Department of National Archives, Colombo
Established 1973(1640); Professional Staff (1979): 5 (+6 temporary)

National Archives had commenced its activities in 1640 with the arrival of the Dutch to the Port of Galle. The well organized Archives maintained by them were handed over to the British in 1796 in terms of the Treaty of surrender of that year. From 1796 to 1947, the Archives formed part of the Chief Secretary's office and with the dawn of Independence in 1947 it was made a separate Department. The main functions of the Department are accruing, conserving, and preserving the Archives of the country for administrative needs, legal requirements, historical research and for posterity. The Department renders advice on matters of organizing and conserving record collections, trains binders for state offices, operates a search room for researchers and has photocopying and microfilming services. It is also the legal depository for all printed publications & newspapers in Sri Lanka.

Publications: Annual administration reports; Instruction booklets on preservation of archives; Sri Lanka Archives; Occasional publications.

1.4 Ceylon National Library Services Board, Colombo
Established 1970; Professional Staff (1979): 10
Objectives (quoted from CNLSB Act No. 17, 1970):

- to plan and assist in the organization and development of library services in general;
- to establish and maintain the Ceylon National Library;
- to advise and assist in the promotion and devleopment of public library services;
- to advise and assist in the promotion and development of school libraries;

- to advise and assist in the publication of reading materials and the production of audio-visual aids;
- to advise and assist in the co-ordination and development of university libraries, junior university libraries, technical college libraries, teachers' college libraries, library services of local authorities, Government departmental libraries, and other special libraries;
- to advise and assist the Government in fixing the minimum academic and professional qualifications for persons employed in library services;
- to promote the development of library education and training; and
- to carry out such other functions as may be necessary for the general promotion of library services.

For a presentation of the situation in 1977 see N. Amarasinghe: "Development of library services in Sri Lanka" (CNLBS, Colombo 1977), reproduced in this report as Appendix VII.

Publications: National Bibliography of Sri Lanka; Library news (newsletter).

1.5 Sri Lanka Library Association (SLLA), Colombo
Established 1974; Membership (1979): 1200
Objectives (quoted from SLLA Law No. 20, 1974):

- to promote the establishment, extension and improvement of library services in Sri Lanka and to set up professional standards;
- to unite all those engaged in, or interested in library work by holding conferences and meetings for the discussion of bibliographical questions and matters affecting libraries;
- to safeguard and promote the interests, welfare, rights and privileges of the member of the profession of librarians in Sri Lanka;
- to train librarians and to conduct professional examinations in librarianship and to issue certificates of proficiency;
- to promote greater co-ordination and co-operation between libraries in Sri Lanka;
- to promote and encourage bibliographic study and research and the publication of professional literature;
- to collect and maintain a library of professional literature;
- to co-operate with library associations and other organizations interested in the promotion of education and culture both within and outside Sri Lanka; and
- to do all such other things as are incidental or conducive to the attainment of the above objects.

2. Health Sector

2.1 Medical Research Institute (MRI), Colombo
Established 1946 (1900); Professional Staff (1979): 35

Early work consisted of general bacteriology, rabies vaccine production and production fo other vaccines. The buildings were expanded in 1936 and other areas of medical research started. Although designated as a Research Institute it also carries out a large amount of routine diagnostic work.

Research divisions: Bacteriology, Serology, Parasitology, Nutrition, Food & water bacteriology, Entero-bacteriology, Mycology, Virology, Pathology, Rabies diagnostic work, Biochemistry, Chemistry of natural products, Pharmacology, Entomology, School of medical laboratory technology.

2.2 Government Analyst's Department, Colombo
Established 1894; Professional Staff (1979): 32

Analyses and issues reports to Courts on Police productions in connection with

the Administration of Justice Law. Analyses specimens sent by Port Commission, Customs, Excice and Health Departments for tariff clarification and quality control purposes. Conducts research into newer methods of scientific analysis and hazards in food, drugs etc. Examines and reports on questioned documents sent by Courts, Police and other Government Departments. The work of the Department covers the fields of Toxicology, Ballistics, Serology, Explosives, Examination of foods, drugs, water, liquors, textiles and other miscellaneous articles.

3. Agricultural Sector

3.1 Agrarian Research and Training Institute (ARTI), Colombo

Established 1972; Professional Staff (1979): 31

Objectives are to undertake and co-ordinate agrarian research and to examine institutional factors basic to the development of agriculture, to offer related training to public officers, members of local institutions and to farmers, and to serve as a repository of agrarian information. It is intended that the Institute will perform certain regional functions relating to agrarian research and training in the Asian region (editor's comment: the emphasis is on social, socio-psychological, economic, managerial and legal aspects).

Publications: ARTI Newsletter; Research Study Series; Quarterly Journal (a farmer's journal); Govijanathawa (Sinhala); Kamanlam (Tamil).

3.2 Central Agricultural Research Institute (CARI), Gannoruwa, Peradeniya

Established 1966; Professional Staff (1979): 122

The Institute conducts research on most crops other than tea, rubber and coconut, with objectives of crop improvement, crop protection, increasing yields and utilization. The main research divisions are: Agricultural botany or crop science, Soil chemistry, Entomology, Plant pathology, Horticulture, and Food technology.

The Institute concerns itself chiefly with wet-zone agriculture but many research and regulatrey activities such as those on Soyabean, Yams and tubers, vegetable Seed, Plant Quarantine & pesticide analysis are coordinated from here.

3.3 Coconut Research Institute of Sri Lanka (CRI), Lunnuwila

Established 1951 (1910); Professional Staff (1979): 40

Activities: Conducting and furthering of scientific research with the objectives of improving production and efficiency in regard to both agronomic and processing activities. Maintenance of Headquarters, two sub-stations, two seed gardens for Hybrid production, fifteen nurseries and three other estates.

There are seven research divisions: Agrostology, Biometry, Botany, Chemistry, Crop Protection, Intercropping and Soils. The institute carries out the main activities of: developing pastures and livestock under coconut, agro-ecological studies, crop statistics and forecasting, agro-meteorology, selection and breeding of superior planting material, foliar analysis, sap products, protection from pests and diseases, cultivation with coconut, soil surveys, soil analysis, and studies on behaviour of applied fertilizers.

The Institute also provides plants to meet the needs of the industry and serves as an advisory and guiding institution to State and private agencies in all matters relating to coconut.

Publications: Coconut Quarterly; Ceylon Coconut Planter's Review (occasional); Pol Pawath (Sinhala - occasional); Advisory Leaflets; Library Bulletin; Bibliographical Series on Coconut.

3.4 Rubber Research Institute of Sri Lanka (RRI), Agalawatte

Established 1951 (1910); Professional Staff (1979): 36

Research divisions are: Botany, Genetics and plant breeding, Rubber chemistry, Soil chemistry.

Research work involves selection of high yield clones, trials on the intercropping of rubber with cocoa, treatment of white root disease and leaf and panel diseases, soil surveys, effects of fertilization, frequency of fertilizer application, oil content of cotyledons, preparation of novel forms of rubber, specification of rubber grades.

Publications: Annual reviews; Handbooks; Booklets; Journal of the Rubber Research Institute of Sri Lanka (quarterly); Bulletins; Advisory circulars; Smallholdings folders; Smallholdings booklets.

3.5 Tea Research Institute of Sri Lanka (TRI), Talawakele

Established 1925; Professional Staff (1979): 52

Activities consist of research into and investigation of all problems and matters relating to tea, and provision and publication of information relating to tea.

Main research divisions: Agricultural chemistry, Agronomy, Biochemistry, Entomology, Plant pathology, Plant physiology, Statistics and Technology.

Publications: Administration report; Tea Quarterly; Technical reports; Financial report.

4. Industrial Sector

4.1 Ceylon Institute of Scientific and Technical Research (CISIR), Colombo

Established 1955; Professional Staff (1979): 84

Activities: Testing, investigation and research with the object of improving the technical processes and methods used in industry. To advice on questions of scientific & technological matters affecting the utilisation of natural resources of Sri Lanka. To foster the training of research workers and associations of persons engaged in research. To promote scientific & industrial research through co-operation with government bodies. Dissemination of useful technical information.

Research Divisions:

Chemical Technology; Pilot Plant & Designs (Process Engineering); Applied Physics & Electronics; Rubber Technology; Natural Products; Physical Chemistry; Industrial Microbiology; Agro Industries; Food Technology.

Publications: Annual reports; Technical reports; Bibliographies; Reviews.

4.2 National Engineering Research and Development Centre of Sri Lanka (NERD), Colombo

Established 1974; Professional Staff (1979): 19

Objectives of NERD include Research and Development as well as Consultation. Activities: Promotion of indigenous inventions, processes and know-how in order that industrial and commercial utilization becomes feasible. Supporting of pilot plant and development work. Grant of financial and other assistance for the above purposes. Consultancy service to public and private enterprises on engineering and technological matters.

Publications: Annual report; Introduction to NERD Centre.

4.3 Industrial Development Board (IDB), Colombo

Established 1966; Professional Staff (1979): 102

The IDB has been established for the promotion and development of industries with special emphasis on the small scale sector. The main sections are: Planning; Extension services; Engineering; Marketing; Documentation; Industrial estates.

Publications: Karmantha (Industry - in English and Sinhala); Current awareness service (newsletter).

5. Management and Development Sector

5.1 Marga Institute, Colombo

Established 1972; Professional Staff (1979): 85

The institute devotes itself to the study and analysis of development problems in Sri Lanka. Its program includes analytic studies and research projects on a selected range of socio-economic issues, seminars and public discussions ranging from the village to the Asian regional level; a special programme of translations and an experimental research-cum-action project on small-scale enterprise.

Publications: Annual report; MARGA (quarterly journal); Research Studies Series; Seminar Papers; Translation Series.

5.2 National Institute of Management, Colombo

Established 1968; Professional Staff (1979): 50

The Institute offers consultancy services in all areas of organizational and management activity in industrial and commercial areas, both public and private. It conducts general and specific training programmes designed to improve management skills at all levels, and undertakes research into management problems.

Publication: Annual report.

APPENDIX IVa

LIST OF PARTICIPANTS IN DISCUSSIONS DURING STUDY VISITS

Dr. R.P. Jayawardene, Secretary-General, National Science Council (NSC)
Prof. G.E.O. Peirera, Chairman of the National Science Council (NSC)
Mr. M.A.T. de Silva, Assistant Secretary General, National Science Council (NSC)
Mr. N.U. Yapa, Librarian, National Science Council (NSC), (Acting Head, Sri Lanka Scientific & Technical Information Centre, SLSTIC)
Mr. S. Liyanage, Scientific Officer, National Science Council (NSC)
Mr. N. Anbalagan, Scientific Officer, National Science Council (NSC)
Mrs. N.R. Amarasuriya, Scientific Officer (Publications), National Science Council (NSC)
Mr. B.Y. Kim, United Nations Development Project (UNDP), Colombo
Dr. R. Brown, United Nations Development Project (UNDP), Colombo
Mr. R. Beijer, Charge d'affaires, Swedish Embassy, Colombo
Mr. R.H. Loudon, Charge d'affaires, Netherlands Embassy, Colombo
Prof. G.C.N. Jayasuriya, Vice Chancellor, Ruhunu University
Prof. K.N. Seneviratne, Dean, Medical Faculty, Univ. of Sri Lanka, Colombo Campus
Prof. M. Amaratunge (Dept. of Civil Engineering) Peradeniya University
Prof. P. Jayasekera, Dean, Faculty of Engineering, Peradeniya University
Dr. M.A.I. Goonetileke, Librarian, Peradeniya University
Mrs. I. Kanagaratnam, Librarian, Head of Medical Faculty Library, Peradeniya University
Mr. D.S. Devasirvadham, Librarian, Head of Engineering Faculty Library, Peradeniya University
Mr. E.D.T. Kularatne, Senior Asst. Librarian, Colombo University and President, Sri Lanka Library Association (SLLA)
Mrs. M.N. Wijesinghe, Asst. Librarian (Science), Colombo University
Mr. M.A.P. Senadhira, Head of Medical Faculty Library, Colombo University
Mr. S.M. Kamaldeen, Asst. Director (Library Services), Ceylon National Library Services Board
Mr. T.D.D. Gunasekara, Asst. Director (National Bibliography), National Library Services Board
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Mr. G.K. Upawansa, Head, In-Service Traning Institute, Gannoruwa, Peradeniya
Mr. S. Herath, Asst. Librarian, Dept. of Agriculture, Peradeniya
Mr. T.B. Subasinghe, Director, Agricultural Research & Training Institute (ARTI)
Mr. W. Ranasinghe, Librarian, Agricultrual Research & Training Institute (ARTI)
Dr. U. Pethiyagoda, Director, Coconut Research Inst. (CRI), Lunuwila
Mr. C.Perera, Librarian, Coconut Research Inst. (CRI), Lunuwila
Dr. O.S. Peries, Director, RubberResearch Inst. of Sri Lanka (RRI), Agalawatte
Mr. D.Wijesiri, Research Officer, Rubber Research Institute (RRI)
Dr. A. de S. Liyanage, Research Officer, Rubber Research Institute (RRI)
Dr. N. Yogaratnam, Research Officer, Rubber Research Institute (RRI)
Dr. R.L. Wickremasinghe, Director, Tea Research Institute (TRI), Talawakele
Miss S.Kandamby, Librarian, Tea Research Institute (TRI), Talawakele
Miss C. Nethsinghe, Chief Librarian, Ceylon Institute of Scientific and Industrial Research (CISIR)
Mr. L.F. Yapa, Director, Planning Div., Industrial Development Board (IDB)
Mrs. I. Unamboowe, Director, Documentation, Industrial Development Board (IDB)
Miss S.M. Jayawickreme, Asst. Doc. Officer, Industrial Development Board (IDB)
Dr. J. Johnston, British Council, Colombo
Mrs. M. Goonaratne, Librarian, American Center, Colombo
Mr. K. Ramathas, Syst. Engineer, Wang Computer Ltd., Colombo

Mr. T.L. Chandranath, Sales Engineer, Wang Computer Ltd., Colombo
Mr. G. Santhiran, Manager, IBM, Sri Lanka
Mr. J. Sivanathan, System Engineer, IBM, Sri Lanka
Mr. T. Nadesan, Programmer/Syst. Analyst, Statistical Unit Computer Div., Colombo University
Mr. M. Senanayake, Printer, University Press, Katubedde
Mr. S. Rubasingam, Librarian, Moratuwa University
Dr. V.G. Podoinitsyn, Director of Unesco Office of Science and Technology for South and Central Asia, New Delhi

INSTITUTIONS VISITED

British Council, Colombo
Netherlands Embassy, Colombo
Swedish Embassy, Colombo
United Nations Development Program (UNDP), Colombo
National Science Council of Sri Lanka, Colombo
Medical Faculty Library, Colombo University, Colombo
Main Library, Colombo University, Colombo
Library Association of Sri Lanka, Colombo
Coconut Research Institute (CRI), Lunnuwila
Rubber Research Institute (RRI), Agalawatte
Tea Research Institute (TRI), Talawakele
Agriculture Research & Training Institute (ARTI), Colombo
Central Agricultural Research Institute (CARI), Gannoruwa
Ceylon Institute of Scientific & Industrial Research (CISIR), Colombo
Industrial Development Board (IDB), Colombo
Ceylon National Library Services Board, Colombo
Main Library, Peradeniya University
Engineering Faculty Library, Peradeniya University
Medical Faculty Library, Peradeniya University
Chemistry Dept. Library, Peradeniya University
Main Library, Moratuwa University
IBM - Sri Lanka, Colombo
Wang Computer Ltd. , Colombo
University Press, Katubedde

APPENDIX IVb

SEMINAR FOR RESEARCH LIBRARIANS 1979-01-19 AT SLSTIC:

S. Schwarz: S&T Information Provision to R&D in Sri Lanka

1. Miss P.G. Punchihewa	Water Resources Board
2. Miss K.G. Dias	Institute of Engineers
3. Miss S.M. Jayawickrama	Industrial Development Board
4. Miss Anne Perera	Ministry of Finance & Planning
5. Mrs. G.L.S. Suriarachchi	Div. Dept. of Labour
6. Mrs. I. Somaratne	National Water Supply & Dranage Board
7. Miss J. Samuel	Colombo Dockyard Ltd.
8. Mrs. S.L. Premawardene	Ayurvedic Research Inst.
9. Mr. A. Kathiravelu	Census & Statistics Dept.
10. Mr. G.A.P.J. Silva	Dept. of Town and Country Planning
11. Mr. W. Ranasinghe	ARTI
12. Mr. P. Vidanapathirana	Sri Jayawardenapura University
13. Mr. M.J.C. Perera	Coconut Research Institute
14. Mr. H.W. Wanniarachchi	Forest Dept.
15. Mr. N.U. Yapa	SLSTIC
16. Mr. N. Amarasinghe	Ceylon National Library Services Board
17. Mr. M.A.P. Senadhira	Faculty of Medicine, Colombo Univ.
18. Mr. M.N. Wijeratne	
19. Miss C. Nethsinghe	CISIR
20. Miss Y.S. Kandamby	TRI
21. Miss L.D. Bandaranayake	CISIR
22. Mrs. N. Amarasuriya	NSC
23. Mrs. K.S. Pieris	NIM
24. Miss L. Ramanaden	RRI
25. Mrs. N.P. Wanasundara	NSC
26. Mr. D.B.N. Weckasinghe	Telecom. Training Inst.
27. Mr. D.S.P. Hirimuthugoda	Geological Survey Dept.

APPENDIX V

EPOS-VIRA - A COMPUTERIZED SYSTEM FOR SDI SERVICE AT IDC-RITL

(Translation of Ch. 5 in "Literature Retrieval - A Program in Science & Technology", Report TRITA-LIB-5008, Stockholm 1978)

Lars Klasén & Peter Sabsay
Royal Institute of Technology, Stockholm

INTRODUCTION

SDI (Selective Dissemination of Information, a recognized concept) is a current-awareness service, usually computer based, producing references to literature within subject fields of individual choice.

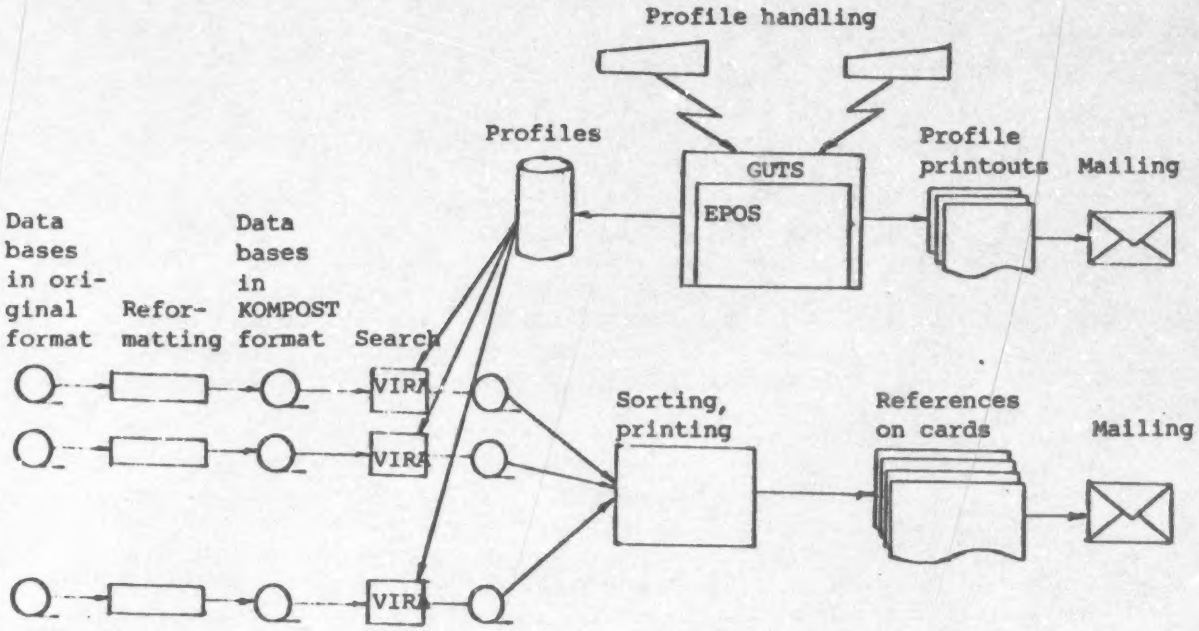
The SDI service at IDC-RITL was initiated in 1967 as a research and development project supported by SINFDOK (The Swedish Council for Scientific Information and Documentation) and today serves research, development and industry in Sweden and abroad. It is one of the most highly developed SDI services in the world and may therefore be used as a starting-point for a description of SDI.

Index and abstract publications nowadays are printed by composer means; thus a large number of literature references are available on magnetic tapes, so called bibliographic data bases. IDC-RITL at present subscribes to 21 data bases, most of them rather comprehensive and more or less multidisciplinary. Together they cover a large part of everything published in the world today within the fields of science and technology in the form of articles, reports, books, conference papers, theses, patents, etc. Altogether those 21 data bases each year announce nearly 2 million references to articles taken from between 15,000 and 20,000 journals, and approximately 1/2 million references to other publications. The number of unique references (doubles occur) searched is approximately 1.5 million annually.

The data bases differ in many ways: in contents, logically, and technically. The data records look different, the density is different, the conventions for writing authors' names and other thing vary, etc., etc. In order for us to be able to use one and the same search program for all data bases, we convert them to a common post format before doing the search itself.

A **search profile** is the formalized description of a query, i.e. of the subject field to be searched, expressed in a way understandable to the computer. It includes words and concepts, so called **search terms**, which are significant of the field of interest and which may be expected to occur in interesting references: e.g. in the title, as index terms, as classification, etc. Names of authors, institutions, journals, etc., may be used too. The search profiles are entered into the SDI system through the profile-handling program EPOS and are stored on a magnetic disk. Also included in a search profile are the conditions regulating the combinations of search terms which must occur in references on the magnetic tapes searched, in order for them to be considered interesting enough. Those conditions are expressed in a so called **search logic**.

The searches are done with the search program VIRA whenever new magnetic tapes arrive at IDC-RITL. The references on the magnetic tapes are compared to the search profiles, and the system prints out those references which correspond to each SDI subscriber's query. The references are printed on cards and are mailed to the subscribers regularly, usually every fortnight.



KOMPOST = compact post format

VIRA = search program

GUTS = terminal system

EPOS = profile-handling program

Fig. 1. Outline of EPOS-VIRA SDI system at IDC-RITL

SEARCH TERMS AND SEARCH LOGIC

The construction of a search profile and the connection between search terms and search logic may be illustrated by exemplification.

Let us suppose we are pursuing research in strength of materials, in particular the field of multiaxial strain fatigue. A retrospective literature search has already been performed, and we now desire a continuous examination of new literature within the subject field in order for us to be able to keep abreast with international research accomplishments.

Some search terms are to be found immediately: MULTIAXIAL, STRAIN and FATIGUE. It is reasonable to assume that if all of those three words occur in one and the same reference, then that reference is of interest. This may be expressed by the condition

MULTIAXIAL **and** FATIGUE **and** STRAIN

or, if as a logical operator we use * instead of "**and**", in the following way (the order of the terms is in this case not significant):

MULTIAXIAL * FATIGUE * STRAIN

In EPOS-VIRA we realize this by putting the search terms each into a **term group** of its own in the search profile: A, B and C; as follows:

A MULTIAXIAL

B FATIGUE

C STRAIN

and by formulating the search logic

LO = A * B * C

Another operator used is +, corresponding to logical "**or**". We will now return to our task. We know that if the concept CYCLIC PLASTICITY occurs in a reference, at any rate in a context treating of "fatigue", then this reference is probably of interest. Naturally we make use of this concept as a search term in our search profile, putting it into a new term group: D. We now have the search terms

A MULTIAXIAL

B FATIGUE

C STRAIN

D CYCLIC PLASTICITY

The new condition, that of also accepting references including CYCLIC PLASTICITY **and** FATIGUE, gives the addition + B * D in our logic, i.e., taken together

LO = A * B * C + B * D

Several search terms may be put into each term group. If we wish to use some synonyms to STRAIN, or words of equal meaning, e.g. STRETCHING and EXTENSION, then it may be suitable to put those as well into term group C. This group will now look as follows:

C STRAIN

STRETCHING

EXTENSION

If we consider it sufficient for at least one of those search terms to occur in references of interest, but with both MULTIAXIAL and FATIGUE occurring at the same time, then the search logic may be written as follows:

LO = A * B * C

The fact that search terms are to be found in the same term group implies automatically an **or**-condition between the search terms. Our search profile now looks like this:

A MULTIAXIAL

B FATIGUE

C STRAIN

STRETCHING

EXTENSION

D CYCLIC PLASTICITY

LO = A * B * C + B * D

A third operator is the subtraction operator -, with the logical meaning "**not**". It is used when we want the computer to eliminate references containing certain concepts.

THE ELEMENTS OF THE EPOS-VIRA PROFILE

This section contains a more detailed account of the elements of the search profile and of the possibilities available for controlling the search.

A search term is any expression consisting of up to 31 signs (including blanks), letters and/or numbers, which are of interest to the query and which may be expected to be found in some field of relevant references (see below). In a search profile we indicate, for each search term used, which field or fields just that search term is expected to check. The indication is given in a form which the computer is able to read, by means of so called **search-term types**.

The most important search-term types, common to all our data bases, are:

Search-term type	Orders search of
0.1	Title field
0.2	Author field
0.3	Field of organization
0.4	Field of journal name
0.5	Field of title words and index terms (the broadest and most-used search-term type)

0.6	Title field and field of free index terms
0.7	Field of index terms (all types of index terms, descriptors, identifiers, etc.)
29	Controlled index terms (often to be found in lists and thesauri specific to each data base)
30	Field of free index terms

In addition there is a large number of search-term types more or less specific to each data base.

The search terms may be **truncated**, which means a "cutting off" of the terms in a suitable place in order for them to be able to retrieve references in which the truncated search term occurs as a part of a word or a stem. In our earlier example we used the search term STRETCHING. If we write *␣STRETCHING␣* (without truncation), the computer when searching will register only those references which contain this entire word, surrounded by blanks. If on the other hand we do a **right-hand truncation**, e.g. giving the search term *␣STRETCH* , references containing STRETCHING and STRETCHED, etc., will be accepted as well as those containing the word STRETCH. Right-hand truncation is a very common way of retrieving singular forms as well as plurals.

By the same token a **left-hand truncation**, e.g. *ION␣*, leads to registration of all references with words ending with the search term given: in this case (apart from ION) references containing ANION, KATION, STATION, CONCENTRATION, BILLION, etc.(!) This very example actually shows clearly the danger of truncating without due consideration.

Words with three of fewer letters should but rarely be truncated. If we wish to retrieve the singular and the plural forms of e.g. CAR, we must include both the search term *␣CAR␣* and the term *␣CARS␣* in our search profile; right-hand truncation, *␣CAR*, would result in the acceptance of words like CARCINOGEN, CARGO, CARTER, CARROT, etc.

Double truncation, i.e. left-hand and right-hand truncation at the same time, is possible but is particularly risky.

The **search terms** are given **weights**, normally the standard weight +2. However, if we so desire we may accord them other weights in the form of integers from -50 to +50. The reason for increasing the weights of certain search terms above others will appear below.

The function of the search logic has been touched on earlier. It constitutes primarily the conditions postulated in order for references to be printed out. Under the heading Search Terms and Search Logic above we treated it in terms of Boole's logic. Pure boolean operators may occur, but more common for EPOS-VIRA is treating of the search logic as an arithmetical expression in which the operators *, + and - have their arithmetical function. The weights of the search terms constitute the operands. The condition for the retrieval of a reference is that the total resulting weight is $\geq +1$. One reason for preferring arithmetical logic to boolean is that it may be utilized for sorting the references in a certain order,

namely in the order of decreasing weight. By e.g. according particularly important search terms a high weight, or by a suitable choice of search logic, the order of the references in the output may be controlled.

The desired ordering of the references may also be accomplished by **weighting in the search logic**. This is done by multiplying (*) the interesting parts of the search logic by positive integers ≤9999 or by dividing (/) less important parts by integers (also +1≤n≤9999). The total weight of a reference, however, must not amount to more than approximately 8,000,000.

In order to illustrate the use of search-term types, truncation, weighting and evaluation of search logic, we will return to our earlier example. We assume that we (within the framework of the earlier search logic) wish to retrieve references in which the search terms are to be found in the title (search-term type 0.1); further that all words starting with STRETCH are of equal value (thus right-hand truncation); that STRAIN is considerably more important than EXTENSION and STRETCH, etc. (thus increase weight of STRAIN); and finally that the references corresponding to the combination A * B * C probably are of greater interest than those corresponding to the combination B * D. We may then construct the search profile e.g. as follows:

```
A  01.  +02   *␣MULTIAXIAL␣*

B  0.1  +02   *␣FATIGUE␣*

C  0.1  +50   *␣STRAIN␣*
   0.1  +02   *␣STRETCH*
   0.1  +02   *␣EXTENSION␣*

D  0.1  +02   *␣CYCLIC␣PLASTICITY␣*

LO = A * B * C * 10 + B * D
```

We now assume that the computer when matching this search profile against a magnetic tape finds two references which correspond to the condition postulated for retrieval. One of them contains in the title field i.a. the words FATIGUE, STRAIN, EXTENSION and CYCLIC PLASTICITY; the other the words MULTIAXIAL, FATIGUE and STRETCHING. Evaluation of the search logic will give the first reference the weight of 4 (0 * 2 * (50 + 2) + 2 * 2 = 4). The second one will get the weight of 8 (2 * 2 * 2 + 2 * 0 = 8) and will be sorted first in the order of precedence. In this case perhaps we did not have so much use of the weighting and ordering mechanism, but suppose we had had a profile giving 100 references a week!

SAMPLES OF SDI SEARCH-PROFILE AND REFERENCE OUTPUT

The figure below is an illustration of a well-prepared so called base profile (i.e. a profile which is called and utilized when searching several different data bases) for search of the query "multiaxial strain fatigue". Compared to our earlier example more synonyms, spelling alternatives and truncated search terms have been used. Besides the search logic is more sophisticated.

```
NAME        : KTHMTEST1                                    PAGE 01
DATA BASE   : BASE                    VERSION : 001
                  ←Shows that this
RANK        : 70    is a base profile
MAX. DEFS   : 0000                    MODIFICATION DATE : 77-08-17
                                      CREATION DATE     : 77-08-17

READ        : IDC

WRITE       : IDC                          The base profile is utilized when
                                           searching these data bases
CALLED BY   : KTHMTEST1.COMPX ←
              KTHMTEST1.INSPEC ←
              KTHMTEST1.MECHEN ←

COMMENTS    : FLERAXLIG TÖJNINGSUTMATTNING

LOGIC       : A*B*C*10+A*B/2+B*D*(A*100+1)+E   ← Weighting in the logic

GRP NO TYP TYPNO WGT CUM    TERM               ← Weighting of search terms

 A  01 TIK  0.5  +50      * MULTIAXIAL*        ← Search on title and index words
 A  02 TIK  0.5  +50      * MULTI-AXIAL*
 A  03 TIK  0.5  +02      * TRIAXIAL*          ← Right-hand truncation
 A  04 TIK  0.5  +02      * TRI-AXIAL*

 B  01 TIK  0.5  +02      *FATIGUE*            ← Double truncation

 C  01 TIK  0.5  +02      * STRAIN*
 C  02 TIK  0.5  +02      * STRETCH*
 C  03 TIK  0.5  +02      * EXTENSI*
 C  04 TIK  0.5  +02      * ELONGATI*
 C  05 TIK  0.5  +01      * DILAT*

 D  01 TI   0.1  +02      * LOW-CYCLE*         ← Search on title only
 D  02 TI   0.1  +02      * CYCLIC PLASTICITY*
 D  03 TI   0.1  +02      * ALTERNATING PLASTICITY*
 D  04 TI   0.1  +02      * INCREMENTAL COLLAPSE*
 D  05 TI   0.1  +02      * SHAKE DOWN*

 E  01 KEY  0.7  +02      * MULTIAXIAL*        ← Search on index words

TOTAL NO. OF TERMS : 0016
```

Fig. 2. SDI search-profile sample

When searching the data base COMPENDEX, which has called the base profile in the example above, the references in Fig. 3 have corresponded to the requirements and have been printed out on cards:

```
KTHMTEST1      COMPENDEX   78-01-24            REF.   1/5 H

CYCLE COUNTING PROCEDURE FOR FATIGUE FAILURE PREDICTIONS
FOR COMPLICATED MULTI-AXIAL STRESS HISTORIES.
  JONES, D. P.   FRIEDRICH, C. M.   HOPPE, R. G.
    ASME PA
    N 77-PVP-25 FOR MEET, SEP 18-22 1977 12 P   9 REFS.
EI 77 12  089577
WEIGHT=150.00   *FATIGUE*FATIGUE*FATIGUE*MULTI-AXIAL*

KTHMTEST1      COMPENDEX   78-01-24            REF.   2/5 H

GENERAL QUADRATIC FAILURE CONDITION FOR METALLIC MATERIALS
UNDER MULTIAXIAL OSCILLATING LOAD.
  TROOST, A.   EL-MAGD, E.
    METAL
    V 31 N 7 JUL 1977 P 759-764   28 REFS.
EI 77 12  091140      GERMAN.
WEIGHT=50.00   *FATIGUE*MULTIAXIAL*

KTHMTEST1      COMPENDEX   78-01-24            REF.   3/5 H

VERIFICATION OF SPECIMENS FOR LOW CYCLE FATIGUE AND CYCLIC
PLASTICITY TESTING.
  SCHULTZ, C. C.   ZIEN, H. M.
    ASME PA
    N 77-PVP-35 FOR MEET, SEP 18-22 1977 12 P   6 REFS.
EI 77 12  093979
WEIGHT=16.00   *FATIGUE*STRAIN*LOW CYCLE*FATIGUE*
CYCLIC PLASTICITY*

KTHMTEST1      COMPENDEX   78-01-24            REF.   4/5 H

LOW-CYCLE FATIGUE UNDER OUT-OF-PHASE LOADING CONDITIONS.
  KANAZAWA, K.   MILLER, K. J.   BROWN, M. W.
    J ENG MATER TECHNOL TRANS ASM
    V 99 SER H N 3 JUL 1977 P 222-228   23 REFS.
EI 77 12  093578
WEIGHT=8.00   *STRAIN*LOW CYCLE*FATIGUE*
```

Fig. 3. Sample of SDI reference output

OBTAINING ORIGINAL DOCUMENTS

The chain cards on which the references are printed are 4 x 8 inches in size and may, apart from being used to build a reference library of one's own, be used directly for ordering copies of original documents. Their back side is prepared to function as an order form; only the customer's name and address need to be filled in. See Fig. 4.

The card is to be sent to RITL where it is treated in accordance with the normal routines of the Library for ordering copies of documents. If necessary the order will be sent to other libraries. In the case of references concerning documents that are rather difficult to obtain, it is usually possible to refer to other suppliers and to give an approximate cost estimate. Often a copy of an abstract, from the abstract publication corresponding to the data base, may be supplied to serve as a basis for the customer's decision to order, or not to order, the original document at an extra cost. After execution of an order the card is returned to the customer.

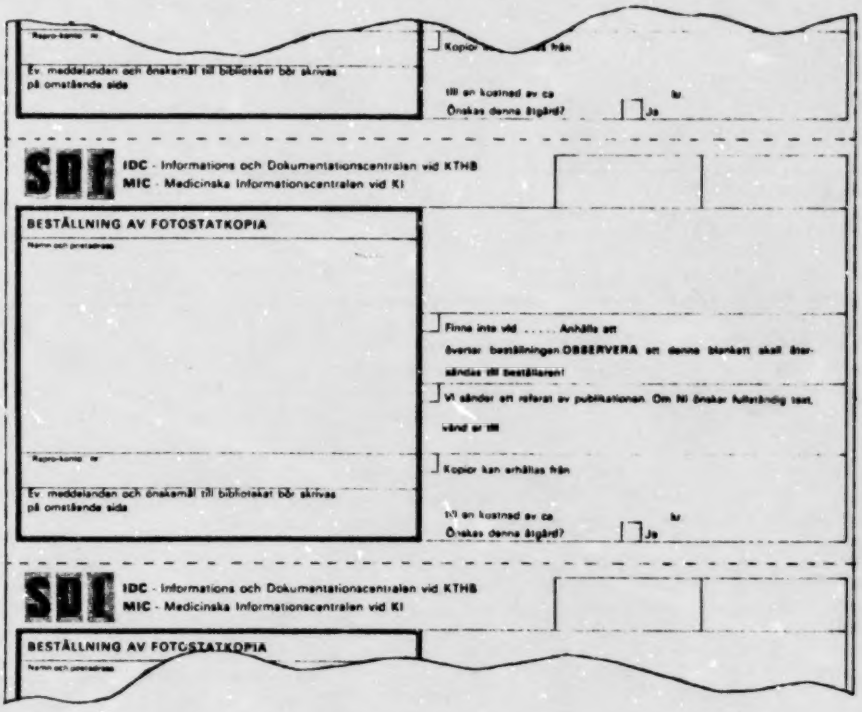

Ev. meddelanden och önskemål till biblioteket bör skrivas
på omstående sida
Kopior kan erhållas från
till en kostnad av ca kr
Önskas denna åtgärd? Ja
SDI
IDC - Informations och Dokumentationscentralen vid KTHB
MIC - Medicinska Informationscentralen vid KI
BESTÄLLNING AV FOTOSTATKOPIA
Finns inte vid ..... Anhålls att
överst beställningen OBSERVERA att denna blankett skall återsändas till beställaren!
Vi sänder en referat av publikationen. Om Ni önskar fullständig text,
vänd er till
Kopior kan erhållas från
till en kostnad av ca kr
Önskas denna åtgärd? Ja
SDI
IDC - Informations och Dokumentationscentralen vid KTHB
MIC - Medicinska Informationscentralen vid KI
BESTÄLLNING AV FOTOSTATKOPIA

Fig. 4. The back side of an SDI card

SDI LIST OF DATA BASES

The list gives an estimate of the contents and sizes of the data bases at present included in the SDI service of IDC-RITL.

Kungl. Tekniska Högskolans Bibliotek

Royal Institute of Technology Library

IDC — The RITL Information and Documentation Center

DATA BASES INCLUDED IN THE SDI SERVICE (May 1978)

ABIPC* Abstract Bulletin of the Institute of Paper Chemistry (USA) contains about 13 000 references per year, to articles, conferences, patents etc. in the field of pulp and paper chemistry and technology. 11 tapes per year are issued. The corresponding printed publication has the same name and periodicity.

AIDS* Abstract Information Digest Services from the Forest Products Research Society (USA) contains about 7 000 references to articles from approximately 180 journals, reports and books in the field of wood technology. The tapes are searched in cooperation with the Swedish Forest Products Research Laboratory. Searches are performed twice a year on tapes covering the period from 1947 to present. No corresponding printed publication exists but the file is available on microfiche.

BIOSIS** BIOSIS Previews from the Biosciences Information Center (USA) contains references to articles, symposia, reports etc. in the field of biology. The data base is divided into two parts, one of which corresponds to the printed publication, Biological Abstracts and the other to the Bioresearch Index; About 250 000 references a year. The tapes are searched three times a month.

CACON* ** Chemical Abstracts Condensates from Chemical Abstracts Service (USA) contains yearly about 380 000 references to articles, conference papers, reports, patents etc. in the field of chemistry. The tapes are searched weekly. The printed publication, Chemical Abstracts is issued weekly.

CBAC** Chemical-Biological Activities from Chemical Abstracts Service (USA) mainly contains biochemical references included in sections 1-5 and 62-64 of Chemical Abstracts Condensates. What makes CBAC especially interesting is its depth indexing and the number of different fields. The tapes cover 40 000 references a year and are searched twice a month.

COMPENDEX* Computerized Engineering Index from Engineering Index Inc. (USA) covers the literature in engineering and technology and biotechnology as well. Primarily it covers articles and conferences but monographs, patents and standards are also included. The tapes contain about 90 000 references a year and are searched monthly. The corresponding printed publication is called Engineering Index Monthly.

CP* Conference Papers Index from Data Courier Inc. (USA) contains yearly about 120 000 references to papers presented at technical, scientific and medical meetings. The tapes are searched once a month. The printed version, Current Programs is issued monthly.

CT** Chemical Titles from Chemical Abstracts Service (USA) contains references to the 700 most important chemical periodicals. The significant feature of CT is its rapid coverage of these journals. The tapes cover about 150 000 references yearly and are searched weekly.

ERIC* ERIC Master Files from the Educational Resources Information Center (USA) contains yearly about 35 000 references to reports and articles in education and modern educational technology. The tapes are searched monthly and correspond to two other publications:
Resources in Education-RIE, which contains reports and Current Index to Journals in Education. Both publications are issued monthly.

FSTA* Food Science and Technology Abstracts from the International Food Information Service (West Germany) covers articles, monographs, patents, standards etc. in food science and technology and yields about 17 000 references yearly. The printed version of FSTA is issued monthly.

GRA* Government Reports Announcements from the National Technical Information Service - NTIS (USA) contains about 55 000 references a year covering reports of research sponsored by the US Federal Government in the fields of science, technology and the behavioural sciences. The tapes are searched every other week. The printed publication Government Reports Announcements & Index is issued every other week.

INIS*** International Nuclear Information System from the International Atomic Energy Agency (Wien) contains about 70 000 references yearly to articles, reports, conference papers, patents etc. in nuclear science and technology. The tapes are searched every other week. The corresponding printed publication, INIS Atomindex is issued twice monthly.

S - 100 44 Stockholm
Sweden

Telephone
08-787 70 00

Telex
103 89 KTHB Stockholm

Postal Giro
15 653-9

INSPEC* Information Service in Physics, Electrotechnology, Computers and Control from the Institution of Electrical Engineers (U.K.) in collaboration with the Institute of Electrical and Electronic Engineers (USA). This data base contains yearly about 150 000 references to articles, reports, patents and other literature in the fields specified in the titel. The tapes are searched every other week. The corresponding printed publication is issued under different titles: Physics Abstracts, issued every other week, Electrical & Electronics Abstracts and Computer & Control Abstracts both issued monthly.

ISI* Science Citation Index Source Data Tape from the Institute for Scientific Information (USA) contains interdisciplinary information from the 4 500 most frequently cited journals in science, technology and medicine. The data base contains about 450 000 references and is searched weekly. The corresponding printed publication, Science Citation Index is issued quarterly.

MECHEN* Mechanical Engineering from the RIT Library (Stockholm) contains 37 000 references a year covering articles, news-items and presentation of new products in the field of mechanical engineering and working of metal. The tapes are searched every other week. No printed version exists.

METADEX* Metals Abstracts Index Tapes from the American Society for Metals in collaboration with the Institute of Metals (U.K.) contains about 30 000 references a year primarily to articles treating the properties of different metals and metallurgy. The tapes are searched monthly. The corresponding printed version, Metals Abstracts is issued monthly.

PA** Psychological Abstracts from American Psychological Association (USA) contains about 26 000 references a year to articles, monographs, dissertations etc. in psychology. Current awareness services are available quarterly and retrospective searches are also made.

PASCAL* Programme Appliqué à la Sélection et à la Compilation Automatique de la Littérature from Centre National de la Recherche Scientifique (INFORMASCIENCE, France) contains 500 000 references a year in the field of science, technology and medicine and corresponds to the different sections of the printed publication Bulletin Signalétique. The tapes are searched every month.

RECODEX*** Report Collection Index from the Research Library at AB Atomenergi (Sweden) contains about 7 000 references a year. Included are those newly acquired reports, standards and patents which are not covered by INIS. The data base covers mainly the field of energy and is searched monthly. No printed version exists.

SSCI* Social Science Citation Index Source Data Tape from the Institute for Scientific Information (USA) contains about 100 000 references a year to articles and news-items in the field of the social science. The tapes are searched weekly. The corresponding printed publication Social Science Citation Index is issued quarterly.

COMMENTS

* data bases administered by IDC-RITL
(acquisition, contacts with issuing institutions, etc).
** data bases administered by MIC (Medical Information Center).
*** data bases administered by AB Atomenergi.

SDI service via the EPOS-VIRA system is also accessible through the Medical Information Center and through several information centers in the Nordic countries.

New from 1979

ENERGY Energy Information Data Base. Produced by US Department of Energy and Technical Information Centre, Oak Ridge. Contains references to literature within the field of energy and related areas. 10 000 references/month. The data base is searched twice a month.

APPENDIX VI

EDUCATION AND TRAINING FOR LIBRARIANSHIP AND DOCUMENTATION SERVICES IN SRI LANKA

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Sri Lanka Scientific and Technological Information Center, Colombo

Abstract

Developments in library education and training in Sri Lanka, since its inception in 1961, are discussed. A survey of present educational programmes, both part-time and full-time, is presented. The programmes are grouped as University and Non-University courses. The objectives, duration, admission requirements, staff (with their qualifications), current number of students, detailed syllabus and examination requirements of each course are outlined. The statutory powers and activities of the Ceylon National Library Services Board are described. Facilities for in-service training of library personnel are given. Some major problems and issues that hinder the development of library education in Sri Lanka are outlined.

☼ 1. Introduction:

Education and Training for Librarianship in Sri Lanka was started relatively recently. The first formal course in library education was started by the Sri Lanka Library Association (SLLA) in 1961, with the objective for training middle-level library assistants. This part-time course was begun on the recommendation of Harold V. Bonny, Unesco Library Expert (1960). The course which was of 3 years duration consisted of 3 parts - the First Examination, Intermediate and Final. Successful students were entitled to apply to the Associateship of the Sri Lanka Library Association after one year post-qualifying experience under a Chartered Librarian.

Graduates who were recruited into the University libraries as Assistant Librarians were sent abroad for one year to obtain the Post-Graduate Diploma in Librarianship. This practise, however, ceased due to lack of foreign exchange. Examination facilities to fit the Professional Examinations of the Library Association, London, were provided by the University of Sri Lanka. Overseas examination facilities for the Part I were terminated by the Library Association (London) in 1975 and will cease for the Part II in 1980.

Various types of courses in library education were started to meet the growing need in the country for trained librarians and documentalists. Most of them, however, existed only for a short duration due to a number of reasons such as lack of qualified teachers, finances, etc. A 2 year full-time course for undergraduates leading to a Diploma in Librarianship was started by the Junior University Colleges at Dehiwala and Palali in 1967 and given up in 1969. A Post-Graduate Diploma in Librarianship was started in 1961 at the Peradeniya Campus of the University of Sri Lanka and given up in 1962.

At present, there are no full-time library schools in Sri Lanka. The only University which conducts courses in Librarianship is the University of Kelaniya (formerly known as the Vidyalankara Campus of the University of Sri Lanka). The present degree course in Library Science at this university leads to the Bachelor of Library Science (BLS). The only available post-graduate qualification in Library Science in Sri Lanka is the Diploma in Library Science and Information Studies at the Kelaniya University. The university also conducts a part-time course leading to a Certificate in Librarianship.

☼ 2. Educational Programmes:

The present facilities for library education can be grouped as follows:

2.1 University Courses (University of Kelaniya)

2.1.1 Certificate in Librarianship (Part-time)
2.1.2 Bacherlor's Degree in Library Science (BLS) (Full-time)
2.1.3 Post-graduate Diploma in Library Science and Information Studies (Full-time)

2.2 Non-University Courses

2.2.1 Professional degree in Library Science leading to Associateship of Sri Lanka Library Association (part-time)
2.2.2 Preliminary and Diploma Course in Librarianship by Sri Lanka Institute for the Study of State Corporations (part-time)

✡2.1 University Courses

Department of Library Science, University of Kelaniya,
Dalugama, Kelaniya.

Staff: 1. Mr. J. Lankage, B.A. (Hons.) M.A. (Cey.), B.Lib. (Hindu Univ.Ban.) Head of Department
2. Mrs. M.D.S. Samarasinghe, B.A., A.L.A.
Instructor

The department was started in 1973. Before the Bachelor of Science (BLS) degree course was started, Library Science could be offered as a subject for the Bachelor of Arts (General) Degree, after the 1st year qualifying examination.

All the Library courses at the University are conducted in Sinhala. The department has requested for a Tamil lecturer in Library Science from India to start classes in the Tamil medium as well.

In-service training for all the courses offered at the University is provided by the University Library.

✡2.1.1 Certificate in Librarianship

This course was started in November 1976. Term commences with the academic year of University. Part-time course, classes are held on Sundays.
Duration: 3 academic years.
Students: 186.
Staff: 10 to 15 visiting lecturers.

The course is conducted in 3 tiers:

I. Certificate in Librarianship - Part I
II. Certificate in Librarianship - Part II
III. Higher Certificate in Library Science & Documentation Services.

I. Certificate in Librarianship - Part I

Objective: to provide the necessary knowledge and practise for those in the Technical Assistant's grade in the library services.
Duration: 1 year. A 2-week practical training period is also included.
Admission requirements:

1. A pass in 3 subjects at the General Certificate of Education (Advanced Level) or a pass in 6 subjects of the General Certificate of Education (Ordinary Level) and 3 years' service in a recognized library.
2. A pass in English at the General Certificate of Education (Ordinary Level) Examination..

Examination: 4 papers of 3 hrs. duration.

Syllabus:

1ST PAPER - LIBRARY TECHNICAL SERVICES
1. Introduction to technical services
2. Acquisition of books
3. Processing of books
4. Maintenance services

2ND PAPER - LIBRARY READER SERVICES
1. Introduction to reader services
2. Reference books
3. Registration of readers
4. Book circulation

3RD PAPER - ORGANISATION OF LIBRARY MATERIAL
1. Classification
2. Cataloguing
3. Preparation and filing of catalogue cards
4. Library catalogue and shelf list

4TH PAPER - ORGANISATION OF LIBRARIES
1. Technical and administrative techniques
2. Maintenance of files
3. Library buildings and equipment
4. Libraries and audio-visual material

II. Certificate in Librarianship - Part II

Objective: to provide the necessary knowledge and practise in Library Administration and Technical Services.
Duration: 1 year. Part-time.
Admission requirements:
Candidated should possess at least one of the following:
1. A pass in Part I of the Part-time Certificate.
2. A pass in the First Examination of the Sri Lanka Library Association with at least 1 year post-qualification experience.
3. A general degree with librarianship as a subject or equivalent.

Examination: 4 papers of 3 hrs. duration.
A thesis not less than 2000 words, a short index or a bibliography relating to a topic in the field of librarianship should be presented before the examination.
Syllabus:

1ST PAPER - LIBRARY & COMMUNITY
1. Nature, extension and objectives of national library services (local & foreign).
2. Public library services
3. School library services
4. Special library services

2ND PAPER - LIBRARY ORGANIZATION & ADMINISTRATION
1. Library administration
2. Technical services
3. The library and the state
4. Library buildings

3RD PAPER - CLASSIFICATION & CATALOGUING
1. Detailed study of the Dewey Decimal Classification

2. The other main classification schemes
3. Important rules of the Anglo-American Cataloguing Rules
4. Cataloguing problems

4TH PAPER - READER SERVICES & DOCUMENTATION SERVICES
1. Reference books and their use
2. Preparation of indexes & bibliographies
3. Document reproduction
4. Bibliographic sources of literature on social sciences, humanities and sciences

III. Higher Certificate in Library Science and Documentation Services
(Part-time Certificate Course in Librarianship - Part III)

Objective: for executive grade employees in middle level libraries.
Duration: 1 year. Part-time.
Admission requirements:
1. Candidates should have passed Part II of the Part-time Certificate Course, or
2. Passed the Intermediate examination of the Sri Lanka Library Association or equivalent, or
3. Passed the First Examination of the Sri Lanka Library Association with 10 years service in a library.

Examination: 4 question papers of 3 hours each.
Syllabus:

1ST PAPER - ORGANIZATION & ADMINISTRATION OF LIBRARIES
1. Organization of technical services
2. Formulation of library regulations
3. Principles of library administration
4. Administration of library personnel

2ND PAPER - PRINCIPLES OF HIGHER CLASSIFICATION & CATALOGUING
1. Principles of classification (emphasis on Dewey Decimal Classification scheme)
2. Modern trends in classification
3. Principles of cataloguing
4. Problems in cataloguing and evaluation of solutions offered by cataloguing codes

3RD PAPER - PRACTICAL CLASSIFICATION & CATALOGUING
1. Classification & cataloguing of data given in terms of the DDC, UDC and the AACR
2. Practical bibliography & indexing

4TH PAPER - DOCUMENTATION & REFERENCE SERVICES
1. Principles of documentation services
2. Documentation and bibliographical services
3. Document reproduction
4. Current book publication

☼ 2.1.2 Bachelor's Degree Course in Library Science (BLS)

started in 1974.
Objective: to impart an academic knowledge in Library Science and a practical knowledge in Library Service and Administration.
Duration: 2 years (after the University First Examination). Full-time.

Admission requirements:

1. A full pass in First Examination in Arts.
2. A pass in English either at the First Examination in Arts or at the General Certificate of Education (Ordinary Level).

Staff:
1. Mr. J. Lankage, B.A. (Hons.) M.A., B.Lib. (Hindu-Univ.Ban.). Head of Department.
2. Mrs. M.D.S. Samarasinghe, B.A., A.L.A., Instructor.

Students: First year students = 5
Second year students = 5
No. of students who received BLS Degree in
1976 = 20; 1977 = 15; 1978 = 12.

Examination: Part I - 4 papers of 3 hrs. duration
Part II - 5 papers of 3 hrs. duration.

Syllabus: Part I:

1ST PAPER - LIBRARIES AND LIBRARIANSHIP

1. Introduction to library science
2. Library and society
3. Library and state
4. Library and education
5. Library and mass communication
6. Categories of libraries and library services
7. Training in librarianship

2ND PAPER - HISTORICAL BIBLIOGRAPHY

1. Principles of historical bibliography
2. Printing - its history and development
3. Publishing and sales
4. Censorship

3RD PAPER - LIBRARY ADMINISTRATION

1. Library planning
2. Book stock. Library resources
3. Sources of bibliography. Book selection and acquisition
4. Processing of books
5. Library buildings, furniture and equipment

4TH PAPER - READER - SERVICES

1. Reference materials and their use
2. Reference services
3. Non-book materials and audio-visual aids
4. Inter-library loans
5. Different categories of bibliographic literature
6. National and international library co-operation
7. Library extension services

Syllabus: Part II:

1ST PAPER - CLASSIFICATION (THEORY)

1. History and principles of classification
2. Salient features of library classification
3. Outline study of major classification schemes
4. Detailed study of Dewey Decimal Classification
5. Special problems of library classification in Sri Lanka

2ND PAPER - CATALOGUING

1. History and principles of cataloguing

2. Anglo-American Cataloguing Rules (British text, 1967)
3. Physical forms of catalogue
4. Classified cataloguing
5. Simple cataloguing
6. Limited cataloguing
7. Dictionary cataloguing

3RD PAPER - CLASSIFICATION & CATALOGUING (PRACTICAL)

This question paper is related to papers I & II and it is intended to examine the candidate's competence in practical classification and cataloguing. Candidates are given title pages and they are expected to prepare main and added entries and to give reference. They are allowed the use of 16th, 17th or 18th edition of the Dewey Decimal Classification, Anglo-American Cataloguing Rules, Sears List of Subject-Headings.

4TH PAPER - DOCUMENTATION SERVICES

1. Preparation of bibliographies
2. Abstracting
3. Indexing
4. Reprography
5. Copyright

5TH PAPER - TECHNICAL ENGLISH

1. Technical English: Knowledge of technical terms used in library science text books and related material.
2. Comprehension: Ability to understand English as used in library routines and correspondence.
3. Writing ability: Ability to write good English in the context of library routines and correspondence.
4. English structure: The basic grammar and syntax of written English as used in academic exposition, library routines and correspondence.

☼ 2.1.3 Post-graduate Diploma in Library Science & Information Studies:

Started in 1974.
Duration: 1 year. Full-time
Admission requirements:

1. A degree with a first or second class, or
2. A degree and a pass in the First Examination of the Sri Lanka Library Association, or
3. A degree and 2 year service in a recognized library, and
4. Proficiency in the English language.

Staff:

Permanent Lecturer:

J. Lankage, B.A. (Hons.) M.A. (Cey.) B.Lib. (Hindu Univ.Ban.)

Visiting Lecturers:

1. M.A.P. Senadhira, B.Sc. (Cey.) Dip.Lib. (Lond.), F.L.A., Senior Assistant Librarian, University of Colombo.
2. T.G. Piyadasa, B.A. (Calc.) Dip.Lib. (Lond.), Librarian, University of Kelaniya.
3. P.A. Piyasena, B.A. (Cey.) Dip.Lib. (Lond.), Senior Assistant Librarian, University of Kelaniya.
4. Mrs. Ishwari Corea, B.A. (Hons.), Dip.Lib. (Lond.), A.L.A., Chief Librarian, Colombo Public Library.
5. K.D.G. Wimalaratna, B.A. (Hons.), S.A. (Padua, Italy), Assistant Archivist, National Archives.
6. Mr. K. Jayatilleke, Pradeepa Publishing Co.
7. Mr. Edwin Ariyadasa, Lake House.

Present No. of Students = 8.

Course: Part I (2 papers)
Libraries, library profession and library resources

(a) Libraries and library resources
History of education, conservation and dissemination of knowledge; History and philosophy of libraries and librarianship from ancient to modern times; Great libraries of the world; Bibliography - its definition, purpose, types and principles; Historical bibliography - documents on knowledge, different types and their characteristics; History of books, writing, printing, book production and publication.

(b) Library profession and library administration
Library service as a profession; Professional organizations and associations; Library Education; Types of Libraries - national, academic, public, special and school; Library regulations; Organization and administration of public libraries and school libraries; Organization and administration of academic and special libraries; Library buildings - equipment and stores.

Part II (4 papers)
Library stock and its organization

(a) Library stock - selection, acquisition and processing
Bibliographic sources - tools for book selection, principles and techniques of book selection; Acquisition and organization of a library collection and preparing it for the reader; Preservation and conservation of the collection; Centralized and decentralized processing schemes.

(b) Library stock - classification
Principles and history of knowledge and library classification; Classification schemes - Bliss, Colon, Dewey, Library of Congress and Browns subject classification schemes, method of classification; Detailed study of the Dewey Decimal Classification scheme and classification of libraries by this scheme; Classification and subject cataloguing, compilation and distribution of cataloguing and other data; Application of subject cataloguing and subject headings.

(c) Library stock - cataloguing
History and principles of cataloguing; Comparative study of the main rules in cataloguing; Detailed study of the AACR. Alphabetical and classified catalogues - principles and use; Peripheral books required for cataloguing; Physical forms of catalogues; Limited and simplified cataloguing; Centralized, co-operative and shared cataloguing; Organization and administration of the cataloguing division.

(d) Library material - practical cataloguing and classification
Organization of knowledge through classification and cataloguing. Similar to II(b) and II(c) above. (Candidates will be allowed to use the AACR, Sears list of subject headings and Library of Congress list of subject headings).

Part III (2 papers)
Library & bibliography services

(a) Utilization of library material - reader services
Different types of reference material and their use; Organization of reference material; Systems and methods of issuing books; Literature searches; Reader guidance and advisory services; Special readers' services; Audio-visual equipment and their use; Library extension services.

(b) Special services
Different methods of obtaining bibliographical tools and different categories; National and international bibliographical, abstracting and documentation services; Oriental bibliographic search relating to China, Japan, South-East Asia, India, Western Asia & Sri Lanka; Preparation of bibliographies, catalogues and abstracts; Mechanical bibliographical information retrieval systems; Duplicating services; Library cooperation - national & international research library service methods.

Note: Special emphasis to libraries in Sri Lanka and Eastern countries.

Practical training

Candidates are required to undergo a two weeks training course in a library. They will be trained in various divisions of the library and their ability, skills and aptitudes will be tested.

Examination: Written examination and practical tests

1. Library and bibliographical services
2. Library science and library administration
3. Selection, acquisition and processing of library stock
4. Library resources - classification
5. Library resources - cataloguing
6. Practical cataloguing and classification
7. Readers' services
8. Library stock - special services

✡2.2 Non-University Courses:

✡2.2.1 Professional Examinations of the Sri Lanka Library Association (Colombo) leading to the Associateship of the SLLA

The Association was started in 1961 with the objective of providing professional qualifications in Library Science and Documentation to local librarians. Three levels: First Examination, Intermediate Examination and Final Examination. After completing the Final Examination, working under a Chartered Librarian for 1 year and completing a project a student is entitled to apply for the Associateship of the Sri Lanka Library Association.

The Intermediate Examination is considered to be at the same level as the Professional Examination Part I of the Library Association (London). Lectures are conducted in English, Sinhala English and Tamil. Centres for conducting lectures are Colombo, Jaffna and Kandy.

No. of Students: First Examination - 300; Intermediate Examination - 100; Final Examination - 80.

Staff: Visiting Lecturers:

1. M.A.P. Senadhira	Senior Asst. Librarian, University of Colombo.	B.Sc., Dip.Lib. (Lond.), F.L.A.
2. N. Amerasinghe	Director, National Library Services Board, Colombo.	B.A. , Dip.Lib. (Lond.) A.L.A.
3. E.D.T. Kularatne	Asst. Librarian, University of Colombo.	B.A. (Lond.) Dip.Lib. (Lond.) A.L.A.
4. N.U. Yapa	Librarian, National Science Council, Colombo.	B.Sc. , A.L.A.
5. Mrs. P. Kularatnam	Asst. Librarian, University of Colombo	B.A., M.A., Doctorat de l'Universito (Paris), Dip. French (Paris), Dip.Lib. (Lond.), A.L.A.
6. Mrs. M.N. Wijesinghe	Asst. Librarian, University of Colombo.	A.L.A. B.Sc., Dip.Lib. (Lond.)
7. Mrs. Ishwari Corea	Librarian, Public Library, Colombo.	B.A. , Dip.Lib. (Lond.) A.L.A.
8. S.M. Kamaldeen	Deputy Librarian, Public Library, Colombo.	B.A. , D.Ed. (Toronto) Dip.Lib. (Cey.)
9. Miss C. Nethsinghe	Librarian, Ceylon Inst. of Scientific & Ind. Res., Colombo	B.Sc., M.A. (Lond.) A.L.A.
10. J.V. Fernando	Asst. Librarian, University of Peradeniya.	A.L.A.
11. N.T.S.A. Senadhira	Asst. Librarian. University of Peradeniya.	B.A., Dip.Lib. (Lond.), A.L.A.
12. M.A. Gunapala	Asst. Librarian, University of Peradeniya.	B.A., Dip.Lib., A.L.A.
13. N.A.W.A.T. Alwis	Asst. Librarian, University of Peradeniya.	B.Sc. , Dip.Lib. (Cey.)
14. George Tambiah	Librarian, University of Jaffna.	B.A., M.S.
15. V.E. Packianadan	Lecturer (Formerly Libr.) Polytechnic, Colombo.	M.A. , M.S.
16. T.D.B. Gunasekera	Asst. Director, National Library Services Board, Colombo.	B.A. , Dip.Lib. (Cey.)

I. First Examination in Library Science

Duration: 1 year. Part-time. Week-end classes.
Admission Requirements: One of the following qualifications:

(a) S.S.C. or G.C.E. (0 Level) 6 subjects of which one should be Sinhala or Tamil with three credits at one and the same sitting. A candidate should have a pass in English if he/she intends to follow the course in that medium.

(b) Candidates who intend to follow the course in Sinhala or Tamil medium should have a pass in the English language or working knowledge of English. (Those who possess only a working knowledge will have to appear for a test).

(c) Experience of having worked in a library for a period of not less than five years in the capacity of a library assistant or in a higher or similar capacity and a pass at least in five subjects at the G.C.E. (0. Level). The requirements in language proficiency shall be the same as that indicated in section (a) above.

(d) A pass in the First Examination of any recognized University. The requirements of Language shall be the same as that indicated in section (a) above.

Examination: 4 papers.

1ST PAPER - LIBRARIANSHIP AND TECHNICAL SERVICES

Librarianship: Introduction to librarianship, types of libraries, types of material.
Administration: Functions of a Librarian: (a) professional (b) academic; Library authority and committee; Staff, furniture, equipment, building, budget, annual report, statistics.
Acquisition: Selection, orders, gifts, exchanges.
Accessioning: Books, periodicals, non-book materials.
Classification and cataloguing.
Processing.
Arrangement of library material.
Services: Circulation section, reference section, periodicals section.
Registration of Readers.
Circulation systems: Newark, Browne, inter-library loans.
Maintenance: Preservation, repair and binding; Building and equipment.

2ND PAPER - CLASSIFICATION & CATALOGUING

1. Classification: Introduction; Features of a book, classification; Notation; Dewey Decimal Classification: Main features; Main classes; Divisions; Sub-divisions; Form divisions (Standard sub-divisions); Geographical divisions; Period divisions; Mnemonic features; Relative index.
2. Cataloguing: Introduction: Purpose, Types of catalogues; Contents of a catalogue entry; Catalogue Codes; Author entry; Title entry; Subject entry; Other added entries, cross references etc; Simple rules (AACR British Text): Personal author; Corporate author; Periodicals; Maps and atlases; Translations and revisions; Filing of catalogue cards: Word by word; Letter by letter; Shelf list.

3RD PAPER - CLASSIFICATION & CATALOGUING (PRACTICAL)

Titles of works and details from the title page will be given to candidates in order to test their practical knowledge. 16th or 18th edition of the DDC will be used for classification. Preparation of entries for a classified catalogue.

4TH PAPER - REFERENCE SERVICES

Introduction; Reference works: General Reference works; Encyclopedias; Bibliographies; Maps, etc.; Year books; Bibliographies; Indexes; Subject reference: Humanities, Social Sciences and Natural sciences; Special reference works: Publications of international orgnaizations, learned societies and Sri Lanka Government Publications.

II. Intermediate Examination in Library Science

Duration: 1 year. Part-time. Week-end classes.
Examination: 4 papers.
Syllabus:

1ST PAPER - LIBRARY AND THE COMMUNITY

Ideals of librarianship: Philosophy, motive, services, etc., and relationships to the Society and Community; Types of libraries and types of services (NOT organization or administration): The different types of libraries and their impact on the community that they serve; History of libraries and librarianship, with special reference to Ceylon; Library education in Ceylon, India, U.K., U.S. and other countries; Inter-library co-operation; Book censorship and society; Ceylon Library Association and other National Library Associations; Professional and other associations connected with librarianship (international). A knowledge of the functions of various societies such as the Aslib, National Book League, Asian Federation, British Council, I.F.L.A., F.I.D., UNESCO etc., and contributions to the community; Book Trade in Ceylon: Production, promotion and distribution of reading materials.

2ND PAPER - ORGANIZATION AND ADMINISTRATION OF LIBRARIES
The functions, organization and adminsitration of all types of libraries: National; Public; University; School; Special libraries; Government and control with special relation to the different types of libraries and their authorities; Finance with the same implications; Library planning; Staff: Selection and types; Training and qualifications; Remuneration and conditions of service; Duties and development; Library material: Scope, subject and types; Assessment of reader's demands; Selection and acquisition; Committee or authority/librarian relationship; Financial resources; Supply sources; Storage service; Safeguards: insurance, etc. Special services: Documentation and bibliographic services, indexing, abstracting, translating, reprography; Co-operation, national and international.

3RD PAPER - ORGANIZATION OF KNOWLEDGE
Bibliographic organization of knowledge through cataloguing and classification; Basic principles of book classification; Detailed structure and main features of UDC, LC, Bliss and Colon classifications; The nature, functions and physical forms of catalogues; Dictionary and classified catalogues: descriptive and critical study; Author and title cataloguing: general, historical and critical study of AACR; Descriptive cataloguing; Subject cataloguing: Types of entry - contents and purposes of each (subject entry, subject indexing, chain indexing and subject lists); Analytical cataloging; Filing; Selective and simplified cataloguing: co-operative and centralized cataloguing.

4TH PAPER - BIBLIOGRAPHIC CONTROL AND SERVICES
Contemporary book production methods, physical make up of books, periodicals and other types of reading materials. Paper and elements of printing. Use of documentary reproduction, including copyright. - U.B.C., UNISIST; General bibliographical centres: development and control of all forms of printed material published and unpublished; Types of reference material and their use. Evaluation and a comparative critical study of types of materials in English, French, German, Russian (i.e. dictionaries, encyclopaedias, bibliographies, etc.); Ceylon reference material including Government Publications; Publications of UN and associated agencies; U.K., U.S.A., and Indian Gov't. Publications; Bibliographic Services: Use of books and printed materials to answer readers queries; Reader's advisory service; Compilation of Bibliographies; Abstracting and indexing; Book reviewing; Other means of revealing resources of the library.

III Final Examination:

Duration: 1 year. Part-time. Week-end classes.
Examination: 6 papers which may be taken together or separately in any order.
Syllabus:

1ST PAPER - MANAGEMENT OF LIBRARY SERVICES
General definition, scope and purpose of libraries. The history and development of libraries in Ceylon. The great libraries of the world. Library co-operation, regional, national, international. Legal deposit. The library profession. Professional education. Professional association. Social functions of the library, relationship of libraries to other media for communication and major influences in society, e.g. education, leisure, research and development.

The history, development organization and administration of public, university, school, government and special libraries, in general and particularly leading libraries in Ceylon, India, Great Britain and U.S.A. Library legislation in Ceylon and abroad.

2ND PAPER - DOCUMENTATION AND INFORMATION RETREIVAL
General definition, scope, purpose and need of documentation. Finance, administration, selection and layout and staff of documentation centres, particularly

in Asia. Information sources and services. Levels of organization for documentation, international, national and local. Role of international organisations in this field. Retrieval methods - conventional and mechanical. Indexing service. Types of indexes. Abstracting Service. Translation service. Reprography service. Photocopying, microphotocopying, microtexts, microfilm, microfiche, microcard, microprint, long distance reproduction. Research methods in library science: survey, etc.

3RD PAPER - THEORY OF CLASSIFICATION AND CATALOGUING
Theory of Classification: General Theory of Classification; Enumerative and faceted classifications; Classification for books, periodicals and micro documents; Use of classification for machine aided retrieval; Comparative study of DDC, UDC, LC, Bibliographic classification and Colon.

Theory of Cataloguing: History and types of library catalogues; Classified and dictionary; Kinds of entries, choice of entry; Subject headings - chain procedure; List of Subject Headings; Critical study of the AACR; Alphabetisation and its problems.

4TH PAPER - ADVANCED PRACTICAL CLASSIFICATION AND CATALOGUING
Practical Classification of books, monographs and articles by DDC, UDC, LC and Colon. Practical cataloguing of books having complicated problems.

5TH PAPER - HISTORICAL BIBLIOGRAPHY/BOOK TRADE AND PUBLISHING
History of writing and paleography with special reference to India and Sri Lanka. Writing materials. Transformation from the roll to the codex form. Evolution of the book. Early books, manuscripts, incunabulae. History and methods of printing. Book-binding and decoration. Function and methods of book illustration. Forgeries.

Book trade and publishing. Book production in early times. History of books and book production with special reference to Sri Lanka. Organization procedures and economies of book publishing in relation to major problems of communciation and librarianship. Survey of book publishing. Economics functions of book publishing and distribution. Paperbacks and special editions for developing countries. Copyright.

6TH PAPER - LITERATURE AND LIBRARIANSHIP OF SPECIAL SUBJECTS
Candidates will have to select one of the following:
1. Social Sciences; 2. Humanities; 3. Science and Technology.

☼ 2.2.2 Preliminary Course in Librarianship. Diploma Course in Librarianship

Sri Lanka Institute for the Study of State Corporations (SLISSCO),
380, Bauddhaloka Mawatha, Colombo 7.

SLISSCO was established as a Voluntary Association in July 1971 and promoted with assistance and encouragement from Government to be a national centre for Management Research, Training and Consultancy. One of the objectives of SLISSCO is the collection, study and dissemination fo data regarding State Corporations.

Objective: To provide a diploma course for library workers, equivalent to the Intermediate Examination of the Sri Lanka Library Association.

Duration: Preliminary Course 60 hrs; Diploma Course 80 hrs; Part-time Classes on Sundays.

Admission requirements:
Preliminary course: General Certificate of Education (Ordinary Level) and 1-year working experience.
Diploma Course: Preliminary examination.

Staff: Visiting lecturers (working librarians). :
1. Mr. R.K. de S. Sarath Chandra, B.Sc., B.A., LL.B., Director (Research, Training & Consultancy), SLISSCO.

2. Mr. N.U. Yapa, B.Sc., A.L.A., Librarian, Sri Lanka Scientific & Technical Information Centre.
3. Mrs. L. Wanasundara, B.A., A.L.A., Documentation Officer, People's Bank.
4. Mrs. I. Unamboova, B.A., A.L.A., Director (Documentation), Industrial Development Board.
5. Mr. M.J.C. Perera, Librarian, Coconut Research Institute.
6. Mr. D.B. Rajapakse, B.A., M.B.A., A.M.B.I.M., Dip. Ind. Management, Administrative Manager, Ceylon Steel Corporation.
7. Mr. S.M. Aziz, Assistant Archivist (Technical), Dept. of National Archives.

Students: Preliminary Course = 8; Diploma Course = 6.

Syllabus: Preliminary Course:

The national economy; Industry and commerce; Business and industrial enterprises; Management theory and practice; Organisation theory and practice; Accountancy; Cataloguing; Acquisition, selection and processing; Circulation; Library services; Printing and paper; Book binding and preservation; Reprography; Reference material; Reader services; Classification theory and practice - DDC & UDC; Indexing theory and practice.

Examinations: 1. Theory Part I; 2. Theory Part II; 3. Practicals.

Diploma Course:

History of Librarianship; Documentation - introduction; Information sources; Information systems; SDI services; Printing; Literature searching; Library surveys; Documentation centres; Computers in libraries; Library standards; Library education; Reprography; Organization; Personnel management; Budgetery control; Auditing; Costing; Office procedures; Work study; Statistics; Classification - theory; UDC; DDC; LC; Subject indexing; Keywork indexing; Chain indexing; Citation indexing; Coordinate indexing; Cataloguing - books; Cataloguing - periodicals; Cataloguing - analytical; Cataloguing - maps; Cataloguing - other materials; Form control; Supplies work.

☼ 3. The Ceylon National Library Services Board (CNLSB)

The Ceylon National Library Services Board was established in 1970. Section 14 (h) & (i) of Act No. 17 of 1970 empowers the Board to:

(h) promote the development of library education and training; and

(i) carry out such other functions as may be necessary for the general promotion of library services.

The CNLSB has been conducting short-term orientation courses for working librarians in collaboration with the Department of Local Government and the Ministry of Education. The students are selected by the Local Government Authorities. The duration of the course is one week.

The CNLSB is hoping to organize correspondence courses as recommended in the Final Report of the meeting of Experts on the National Planning of Library Services in Asia-Colombo, Ceylon, 11-19 September 1967 (Unesco-COM/LS/190/6 of 26 April 1968).

☼ 4. In-service Training

In-service training for library personnel and for students sitting the library examinations are provided by recognised libraries and information centres including:

1. British Council Library (Colombo).
2. United States Information Service (USIS) Library.

3. Sri Lanka Scientific & Technical Information Centre, National Science Council.
4. Colombo Public Library.
5. Agricultural Research & Training Institute (ARTI).
6. University Libraries, etc.

☼5. Conclusion

The urgent need for rapid national development in Sri Lanka, today, has greatly increased the demand for current and accurate information in all fields. This has led to an increasing need in the country for well-equipped libraries and information centres staffed by trained and qualified information personnel.

The lack of professionally trained and specialised manpower is one of the most acute problems in our libraries and documentation centres. Therefore, increasing and immediate attention should be given to training sufficient numbers of personnel in library education to fill this gap.

No survey of man-power requirements has been done up-to-date. Such a survey would review the existing library and information manpower resources and enable the assessment of the level of manpower development in Sri Lanka. In addition, it would be possible to assess future manpower requirements and to identify the areas in which education and training is required by professional and semi-professional personnel engaged in library and information work.

The manpower development programme should include facilities for the training of permanent teaching staff to overcome the present shortage of qualified teachers. Adequate scales of pay, status and recognition of academic and professional degrees should be ensured. One of the reasons for the lack of incentive for students to follow the Degree course for the Bachelor of Library Science (BLS) available at the University of Kelaniya is the lack of recognition of the degree awarded.

Apart from the lack of any full-time library schools in Sri Lanka, there is also a scarcity of short-term specialised courses, workshops, and continuing education programmes for teachers and working librarians. The importance of holding such courses in a rapidly developing discipline like information science cannot be overemphasized.

There is a shortage of professional literature in Sinhala and Tamil. The availability of non-book materials for instructional purposes is also very low. The availability of these materials is a vital factor in the development of library education.

At present there are no facilities for research, post-graduate or otherwise, in library science. Much research is needed in Sri Lanka regarding information users, library infrastructure, information handling methods and information needs.

The local library education system will be successful only when all these conditions are fulfilled. The national library and information services will then be able to provide the services which are demanded for research management, administration, and from the general public.

APPENDIX VII

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THE DEVELOPMENT OF LIBRARY SERVICES IN SRI LANKA

Paper submitted to the
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Antwerp University
Belgium

by

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CEYLON NATIONAL LIBRARY SERVICES BOARD
1977

The Development of Library Services in Sri Lanka

The Board

THE creation of a library authority for planning and developing library services on a national scale being treated as a matter of high priority in the educational programme of the country, the Ceylon National Library Services Board was set up in 1970 by an Act of Parliament, as a statutory agency under the Minister of Education. The Board consists of 9 members 2 of whom are appointed by the Minister of Housing and Research and the rest appointed by the Minister of Education from among prominent men in various walks of life. The Chairman of the Board is appointed by the Minister of Education and the Director, National Library Services, is the Secretary to the Board. The Board operates on its own fund to which money is voted by Parliament, besides donations, gifts and grants received from local and overseas sources.

Functions

In terms of the Ceylon National Library Services Board Act, the Board is empowered—

(*a*) to plan and assist in the promotion, organisation and development of Library Services in general ;

(*b*) to establish and maintain the Ceylon National Library ;

(*c*) to advise and assist in the promotion of school libraries ;

(*d*) to advise and assist in the promotion and development of Public Library Services ;

(*e*) to advise and assist in the publication of reading materials and the production of audio-visual aids ;

(*f*) to advise and assist in the co-ordination and development of University libraries, Junior University libraries, Technical college libraries, library services of local authorities, Government Departmental libraries and other special libraries ;

(*g*) to advise and assist the Government in fixing the minimum academic and professional qualifications for persons employed in library services ;

(*h*) to promote the development of library education and training ; and

(*i*) to carry out such other functions as may be necessary for the general promotion of library services.

Advisory Committees

The Board is assisted and advised by several Committees to carry out its objectives and functions. Besides the Public Libraries Committee and the School Libraries Committee which are statutory requirements, an Education Advisory Committee, National Libraries Committee, National Bibliography Committee and a Book Selection Committee have been set up as standing Committees with the commencement of services related and relevant to areas of work of these Committees.

The Board is an institutional member of the IFLA, Library Association, London, and other professional organisations.

National Library

One of the most important responsibilities of the Ceylon National Library Services Board is the establishment of the National Library and the Documentation Centre. Pre-requisites for a National Library already exist ; (*a*) Legal deposit of books commenced in 1885 under the Printers' and Publishers' Ordinance and comprehensive collections which may form the nucleus of the National Library already exist in the repositories of the National Archives and the National Museums, Colombo. An amendment to the Act in 1976 entitles the Board to receive a copy too. (*b*) A complete record of the books and periodicals printed and published within the country is published in the *Ceylon Government Gazette* dating back to 1885. A more formal and scientific recording was started in 1962 with the publication of the *Ceylon National Bibliography* (now, Sri Lanka National Bibliography). Thus the immediate task the Board needs to concentrate on is to make necessary accommodation and create the organisational framework to formalise the functioning of the National Library from which other traditional services will trigger off.

In 1975 the Cabinet approved a sum of Rs. 11.5 million for the construction of the National Library building and a plot of land in the heart of the city, valued over Rs. 2 million, was granted to the Board for the building. UNESCO provided the services of a Consultant Architect and the construction work is well under way. The building will have a capacity of housing 100,000 volumes and provide accommodation for 320 readers. It will also provide space for the National Documentation Centre and the Bibliographic Division, Auditorium with a seating capacity of 80 and 2 lecture halls, office area for the Ceylon National Library Services Board and a few related institutions which will co-operate with the Board in Library Education programmes and directing school and Public Library Services, work places for 80 members of the staff, stores, cafeteria, toilet and garage facilities for the staff, readers and visitors. Considerable foreign aid for equipment and library materials not locally obtainable is expected from friendly governments and international organisations.

A skeleton staff is already recruited and financial provision is made in the estimates to recruit necessary staff as and when the services develop. Money is voted for the purchase of rare works and fugitive material which may not be available later on. Temporary accommodation to house the National Library Book Collection accrued through legal deposit and purchases has already been provided. The Board solicits gifts and donations of rare and valuable books, documents, manuscripts, etc., for the National Collection.

Deposit Library

The Board maintains the National deposit library for local publications which also receives a copy of every UNESCO publication.

Library Development Project

The development programme of the Library Services Board started off with a pilot project begun in 1970 with UNESCO aid. Since then this programme has been extended to cover the entire island, approximately 50 libraries being selected annually for development on a District basis. These project libraries, as they are called, are entitled to a donation of books and periodicals, basic library furniture such as bookshelves, periodical racks, book supports, readers' tables and chairs and such equipment as accession registers, book pockets, date slips and readers' tickets. Libraries whose collections are inadequate for maintaining a minimum loan service are supplemented with book loans from the Board's Book Bank, every three months. Books gifted by Ranfurly in U.K. are also given away as outright donations to many Public and School Libraries. Free training of librarians in elements of library administration and library technology is another aspect of the Board's assistance to these libraries.

Libraries which do not fall within the annual project programme also are given considerable assistance in matters relating to establishment and advice in services. Supply of model library building plans, specifications for library furniture and equipment are two widely sought forms of assistance and counselling in matters of professional/administrative disharmony deadlocks and advice to authorities on grading of libraries and librarians, etc., are frequently given.

Under the development programme a total of 175 school libraries and 175 public libraries have been assisted up to date. A large number of Non-project libraries made up of libraries in agricultural colonies, Book clubs of rural development associations, temples, societies, etc., have been similarly supported. In 1977 January, the Board approved a project of creating new libraries in areas where library facilities are nil, in collaboration with the Local Government authorities and the Ministry of Education, which was hitherto the sole responsibility of these authorities.

Under the scheme proposed the Board steps into the role of library creator in addition to being a library supporter. The programme will be launched in 1978. An important project to be launched in 1978 is the development of libraries of teacher-training colleges the services of which have left much to be desired. The ultimate aim of the library development scheme is to create a National Library infra-structure where all types of Library Services will be co-ordinated to form a viable National Library Service. High priority is given to the establishment and development of school and public libraries to conform to minimum standards of services.

Library Education and Training

On an evaluation of the facilities available in the country for library Education and training, the Board has isolated the following priorities, which need urgent attention :

(1) provide educational and training facilities to untrained and unqualified personnel already in library service ;

(2) provide facilities of continuing education and up-dating knowledge of library staff who have obtained basic qualifications and/or training ;

(3) to make available educational facilities to fresh entrants who choose librarianship as a career.

With these objectives the Board envisages the commencement of a correspondence course in Library and Information Science supplemented by necessary practical work experience, discussions, seminars, etc. The course is of 2 years' duration to be offered in two parts and the examination will be conducted by the Department of Examinations of the Ministry of Education on behalf of the Board. The certificates will be equivalent to the Sri Lanka Library Association Final Certificate and Part II of the professional Examination of the Library Association, U.K. Provision is made for students attached to a formal library school to sit the Board examinations, if they so desire. To implement the programme a Library Education and Training Branch has been set up with an Assistant Director who is in charge of the project under the supervision of the Director.

The Education Advisory Committee of the Board is delegated the authority to evaluate courses in Library Science and Certificates issued by various Library schools and make recommendations to the Board. The Board acts as the final authority in advising the Ministry of Public Administration on fixing minimum qualifications for librarians in the Public Service and Local Government Service and the recognition of certificates.

The training of new staff recruited to service in school libraries and public libraries is an important responsibility the Board has undertaken. The Philosophy behind the training programme is that if all librarians

adhered to a uniform fundamental list of duties and library methods, development of technical services in libraries will be even, which will facilitate library co-operation at a later stage. Thus new staff irrespective of their qualifications or previous training are encouraged and are afforded the facilities for this training.

Library Supervision

As a logical step to training of staff and provision of assistance to libraries is the evaluation and assessment of the progress made by the librarians which come under the development project. With this objective periodic inspections are conducted by the Board's professional staff and the findings of the inspectors are analysed and studied with a view to reviewing methodology applied. The findings are conveyed to the appropriate authorities for remedial action, if necessary.

The education and training courses are designed with a view to training operational staff of various types of libraries which form the library infra-structure being built by the Board.

Publication of Professional Literature

The acute shortage of professional literature in Sinhala and Tamil has considerably hampered the efforts of many organisations concerned with professional activities, particularly education. The Board has, therefore, taken steps to publish standard works in these languages. The *IFLA standards for public libraries* was translated and published in 1977. A complete list of Board publications may be obtained on request. The Board also publishes a quarterly journal which serves as the medium of communication between the Board and those interested in library work.

Prospects

With the establishment of the National Library and the Documentation Centre it is evisaged that bibliographic activities of all types will be undertaken. First in the priority list is the compilation of National Union Catalogues. In the field of documentation, the National Library will concentrate more particularly in Social Sciences as Science and Technology is already covered by such institutions as the National Science Council with its satellites the special libraries, but the National Library will take the leadership in the co-ordination of bibliographic activities of various organisations. It will also be the centre of national and international loans and exchanges, in short the focal point of national and international library activities.